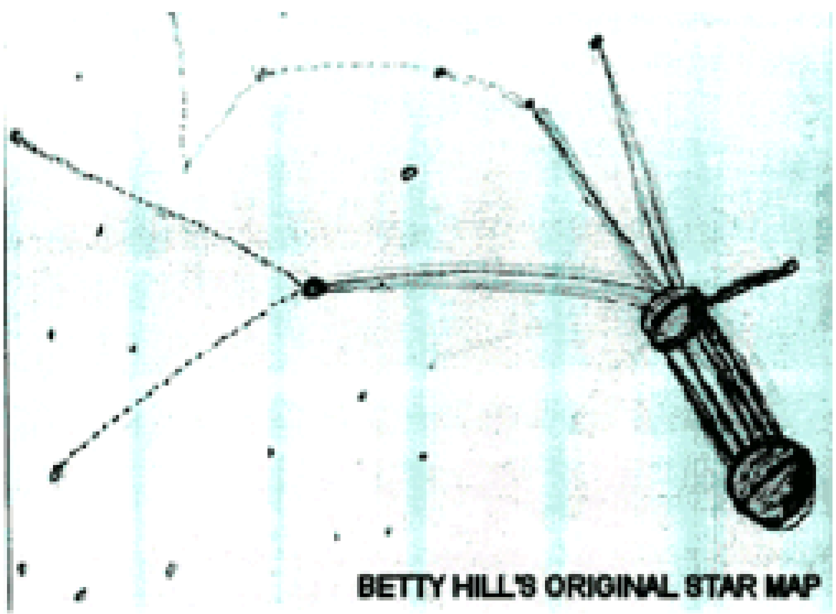
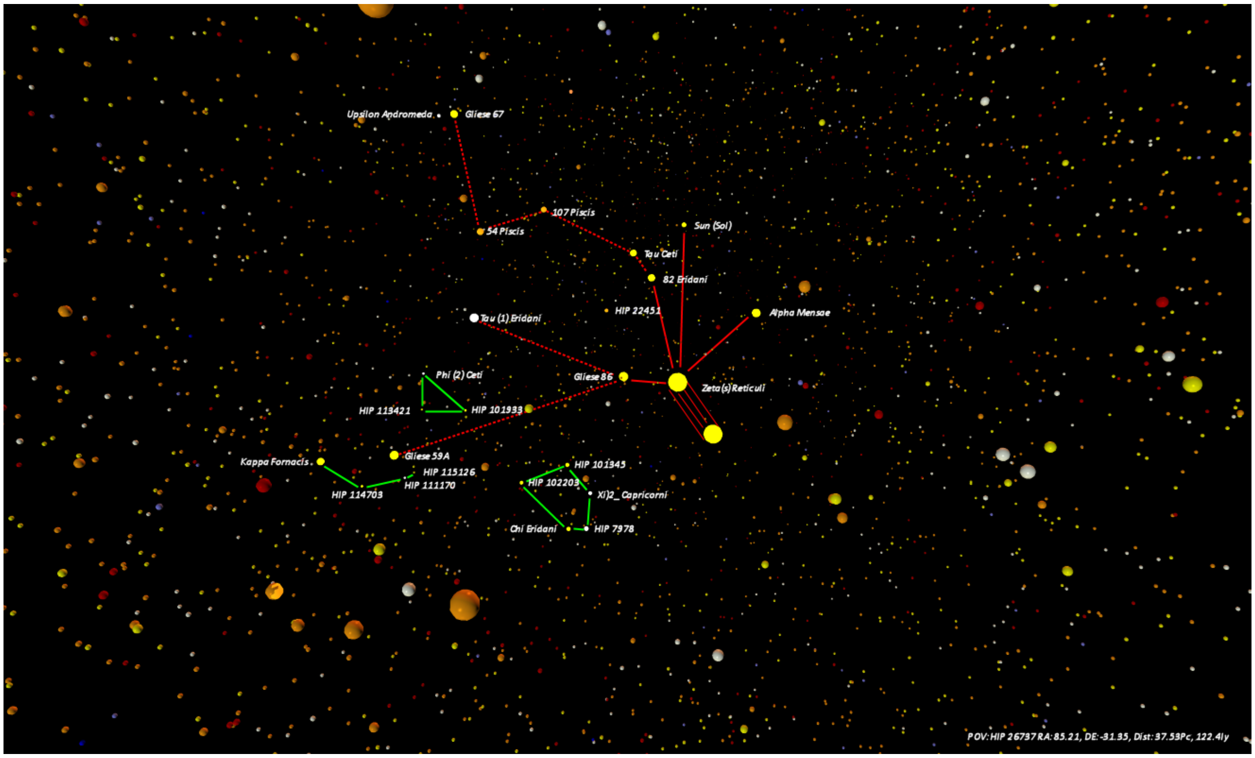
A case for Zeta Reticuli

One of the more famous “Alien” abduction stories, occurred in the early 1960’s. The Betty and Barney Hill event and case is now well documented, and obfuscated. But there was one single piece of data that came from that case that can be used; it is a “template”, or as it is identified, a “star map”.

Betty was given the post-hypnotic suggestion that she could sketch a copy of the "star map". Although she said the map had many stars, she drew only those that stood out in her memory. Her map consisted of twelve prominent stars connected by lines and 13 lesser stars that form several distinctive groups. She said she was told the stars connected by solid lines formed "trade routes", and dashed lines were to less-traveled stars.



1: Original Hill map and our template.



2: Stars of Zeta Reticuli Interest Group

There are a total of 25 stars in the template with 13 identified by Marjorie Fish around 1968. Much of her efforts were undone by others who knew little about Astronomy, in any case, Ms. Fish's work has served well to start this analysis.

Computer modeling and Datasets

To create our view of the stars, and make a search for a match possible we created several database tables to use with Microsoft's SQL server.

DataSets

Hipparcos

The word "Hipparcos" is an acronym for High precision parallax collecting satellite. It was launched in 1989 by the European Space Agency and collected data on over 118,000 stars. There is also an auxiliary table called "Extended Hipparcos" that contains additional astrometric data. These tables are maintained by the University of Strasbourg, Fr.

These two tables were imported into an instance of Microsoft SQL Server Express, and used as the basis for all stellar data.

exoplanet.eu_catalog

A catalog of all known exoplanets. This table was also imported into SQL Server. However the table required some modification to allow it to accurately interface with the Hipparcos tables, and other software.

All of the data elements (columns) imported as text, and there was no record "identity"; so distance and age in a numerical format was added. Software methods were created to populate these new fields with their text counterparts' conversions to a "double" data type. Additionally the Hipparcos index number was added by creating software methods the access "Simbad" (a web service of the University of Strasbourg, Fr.) to obtain a cross reference where possible.

These three data elements constitute the majority of data used in this query. Programming languages used in this data phase were C#, and TSQL.

Computer Modeling

Two categories of model were generated using a combination of C#, TSQL, and Python.

3D Models

Two major 3D models of local star were created. The first was stars within 33 parsec, the second expanded to 46 parsec.

A C# application was created to apply SQL search criteria (everything < 33 parsec) and create a sub table from which astrometrics of individual stars could be retrieved. Using specialized templates written in Python, the position (X, Y, Z), along with star class, and name were compiled into a Python script for use with "Poser" (a 3D modeling and animating application) to place "Bucky balls" of appropriate color, and name into the 3D space provided by Poser.

As I was using the Fish interpretation as a base of sorts I included additional instructions to highlight the stars in her "list". This allowed me to position a "camera" somewhere that was logical to view the "Fish Stars". It was incredibly easy to find such a location, knowing approximately where to look from. As I was refining my view I noticed that I had gone outside my 33 parsec radius. I increased the radius to 46 parsec so that I might know where I was viewing from. After adding the additional stars I found that I was near a star called "HIP-26737", yet another class "G" star in the mix (actually G2V).

2D Models

Methods were also developed to provide 2D Models of individual Star Systems. These method produce a "PNG" file that expresses the star and the orbits of any planets along with a representation of the Stars Habitable Zone. These methods were written in C# and SQL for the Windows Desktop.

Discoveries

There were some discoveries found in these models:

1. Marjorie Fish was spot on with all stars but Kappa Fonacis. I haven't built a model based on the Gliese dataset, so it is entirely possible that better "location" of the star moved it, what is actually, a considerable distance. And, based solely on the stars identified by Ms. Fish; her interpretation isn't really a very good match, but, it did serve as a good starting point.
2. The identity of 13 stars that Ms. Fish didn't identify were identified.
3. Among the newly identified stars were 5 that were not known in either 1961, or 1969; so neither Betty, nor Ms. Fish could have "guessed" their existence and location.
4. The doubling and connecting of the two Zetas Reticuli is suggestive of a Graphical User Interface. It appears that if one were to "mouse over" or touch Zeta Reticuli; it splits into the

two stars of the overall system. Just as doing the same to other stars has the same result. And of course doing that to a multi-star system might show individual solar systems.

Software

Developed Software

A Windows Desktop application was created using Microsoft Visual Studio, SQL Server employing C#, TSQL, and Python. This application was implemented to solve several issues;

1. Providing a method to import star locations in an arbitrary radius, and of arbitrary class, or other metric. This was solved by creating a method to query SQL Server Hipparcos table and extract RA, Decl, and Distance, which was used to compute X, Y, and Z coordinates which were placed in a Python templet. Star class encoded as color, and the star's Hipparcos "ID". This was repeated for each cataloged returned by the query.
   The resulting Python script was then used in SmithMicro's "Poser" (3D modeling and animating software) to construct views on "Local Space" in three dimensions.
2. When importing the European Space Agency's Exoplanet database all data was imported as text, the creation of methods to read the text value of selected data and write the conversion to a new data column, providing a more convenient consumption of the data. Data elements that were converted are distance and age, these elements were converted into floating point numbers. The Hipparcos Identity was also added by interfacing with the "Simbad" resource at University of Strasbourg, Fr.
3. Additional tools to draw planetary orbits and habitable zones associated with arbitrary stars have also been developed.
4. A desktop tool was developed to do "ExhaustiveTempletMatching", a method used in computer vision for optical object recognition. The method used here is from AForgeNet.com. This program allows me to input any "template" (such as Betty Hill's map) and use it to search for a match in another arbitrary image.

Commercial Software

SmithMicro: Poser11 Pro. Allowed the creation of 3D views on any selection of stars, and viewing from anywhere, with virtually any camera.

Paint Shop Pro: Old school image processing application, like "PhotoShop". Allowed editing of images to add, or remove lines, noise, and to accentuate selected stars for easier identification.

Microsoft SQLServer: Relational database engine used to store Astrometric data.

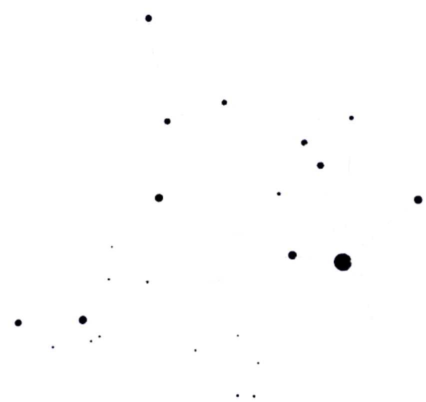
Computer Template Matching

To verify the quality of any apparent match between Betty's "map" and any "snapshot" of known local stars, I searched for and found a Computer Vision "library" that contained methods to perform template matching.

Applying "ExhaustiveTemplateMatching", a template matching method from a Computer Vision Library called "AForge" (available at GetHub, and http://aforgenet.com) with a "similarityThreshold" of 99% results in a single match: 99.1%

To obtain this Betty's original drawing was cleaned up; background made solid white, and all lines connecting the stars were removed, as well as the second "zeta Reticuli". This template was applied to the computer generated view of the stars in question, also filtered to show only stars of interest.

5: Betty Hill's map



6: Recreation of view from HIP-26737 (our map)

Manual Template Matching

13 identified Stars

Marjorie Fish identified 13 primary stars that conformed to the template provided by Betty Hill.

1. Zeta (1) Reticuli
2. Zeta (2) Reticuli
3. Alpha Mensae
4. 82 Eridani
5. Tau Ceti
6. Sol
7. 107 Piscis
8. 54 Piscis
9. Gliese 67 Hip 7918
10. Gliese 86 Hip 10138
11. Tau (1) Eridani
12. Gliese 59A Hip 7235
13. Kappa Fornascis This star was actually a misidentification by Marjorie Fish…

The remainder of the stars are identified here:

14. HIP 22451
15. Upsilon Andromeda
16. Phi (2) Ceti
17. HIP 113421*
18. HIP 101933*

19. HIP 114703*
20. HIP 111170
21. HIP 102203*
22. HIP 101345
23. Xi(2) Capricorni
24. HIP 7978
25. Chi Eridani

26. HIP 26737 (the POV, not drawn on map, and outside search area)

[* unknown prior to 1992]

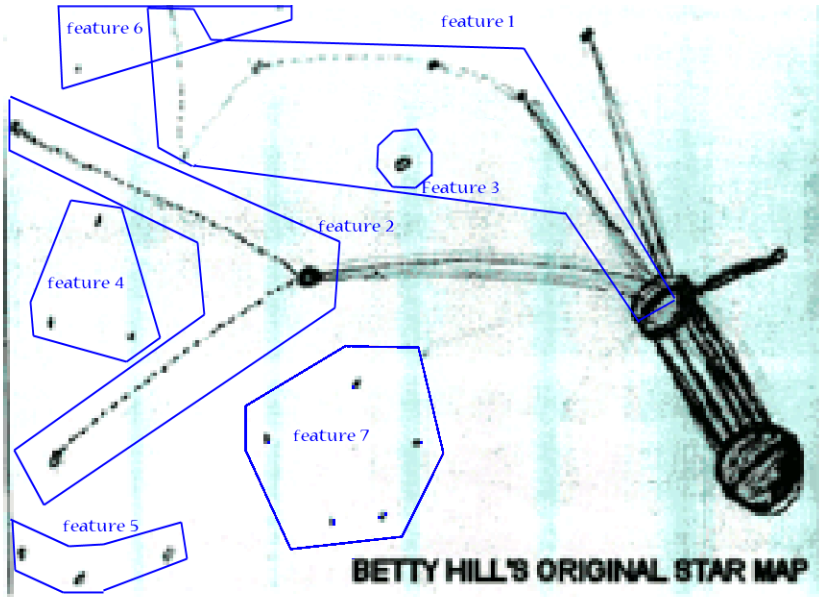
7 groups (blobs)

The original template seemed to lend itself rather well to the definition of seven (7) distinct groups or blobs.

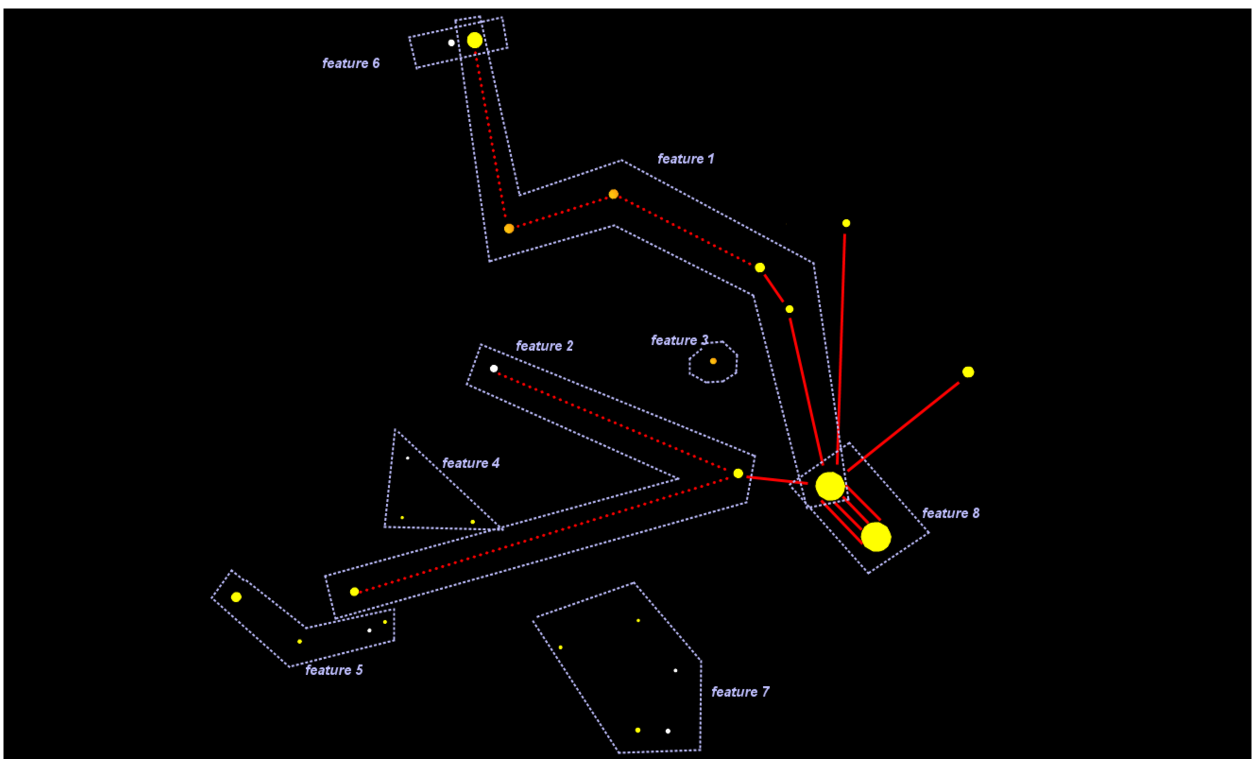
i. The Square Root symbol. This group of stars resembles the mathematical Square Root symbol. I have included the single star of Group 3 in this because they do make for a “whole idea”
ii. The Greater than Sign. This structure resembles the mathematical “Greater Than” sign.

    Note: blob 1 and 2 are the most significant aspects of the “blob” analytics. When taken with blob 3 it begins to form a sort of mathematical expression (“Triangle” > SQRT(“lonestar”)). This “formation” affords us a valuable tool in evaluating possible matches.

iii. Our only single star group. It serves as a method to identify the specific “square root” symbol. When viewed in conjunction with blobs 1 and 2, this feature helps to form an unexpected feature to assist in the identifying process.
iv. The Triangle. A group of three stars forming a sort of triangle within the “Greater Than” sign.
v. The boomerang, this grouping of stars serves to further identify the “Grater Than” sign.
vi. This group of 3 stars that form a union with group 1 seems rather cramped, perhaps by the size of the page at original drawing time. In any case they help to identify the terminus of the Square Root symbol.
vii. The pentagon. This collection of 5 stars form a rough pentagram and help to identify the whole.
viii. The binary pair. While not shown in the “graphic” the host star is depicted as two “joined” stars; logic strongly suggests a binary star.



3 Break down of Template Objects



4 Zeta Reticuli stars as viewed from HIP 26737, RA: 85.21, DE: -31.35, Dist: 37.53Pc, 122.4ly

Blob analytics

We were very lucky, in that the Fish interpretation is very close match. With this as a starting point I was able to identify each of the seven groups in my 3D models of the interest group and of the stars within 46 parsec (150 ly) from Earth.

Group I. This group is clearly present. The Square Root symbol; this unmistakably shaped group stands out in a way that few others could hope to approximate. 100%

Group 2. Again; clearly present. Our greater than symbol is also difficult to confuse. 100%

Group 3. As a single star this group only has meaning in context with other nearby stars. In this case the stars of Group 1 serve as this context, and, again, 100%.

Group 4. The triangle, also clearly present. 100%

Group 5. The boomerang. Ours has a fourth star added to the end. It sort of seemed natural, there was this line of "G" class stars, all about the same distance… 100%

Group 6. Atop the terminus of the square root symbol is a small collection of stars. The original template shows 3 stars, but in a somewhat different configuration. Even allowing for memory issues it is difficult to resolve. If we take only the two left most stars as the group then we can allow enough artistic license to construe that the left most star is Upsilon Andromeda, and the "connected" star is Gliese 67. This at least 'begins" to work, and may be close enough for some. However, for the purpose of this analysis; not close enough, thus a confidence of 40% is assigned.

Group 7. The Pentagon. Ours is a bit misshapen, though there are plenty of apparently suitable stars close by. That however is problematic; as it increases the likelihood of finding a "match" for a star. This too gets a score of 30%.

Group 8. Binary pair. Zeta Reticuli 1 & 2 do indeed form a binary star system. They are separated by enough distance that neither would interfere with the planetary development, or in the evolution of life in each other. They are two closely spaced, yet independent, solar systems. 90%

Mathematical expression

As was suggested above; the combination of specific groups appear to form a mathematical expression. These elements are present in our target. As for what this sublime formula may allude to…I am sure it is quite metaphysical. For now; I will settle for its presence.

⊿ > √.

Stars

Astrometrics for stars selected for the map.

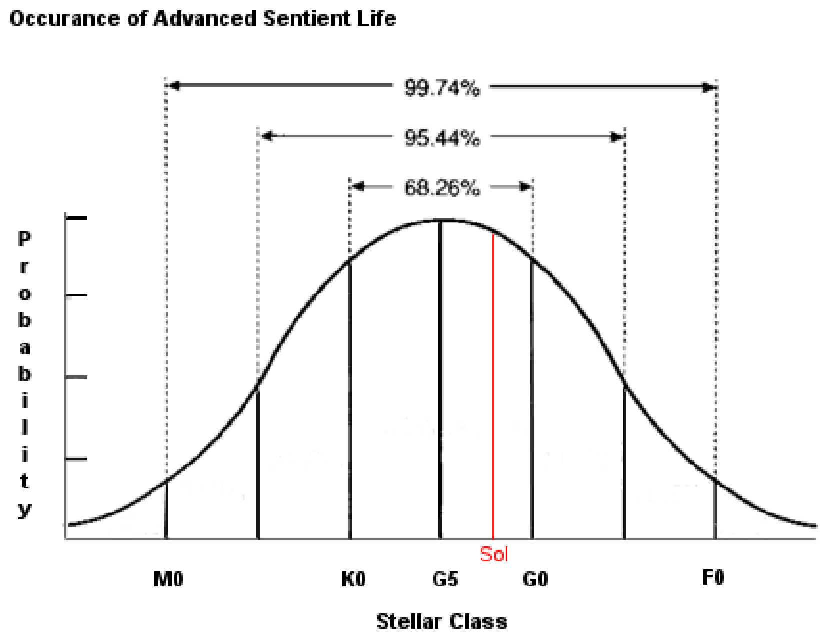
hip	name	age	ra	decl	dist	spClass	planets	varabilityflag	variabilitytype	loclX	loclY	loclZ	locld
7981	107 Piscis HIP7981	0.2	25.62479	20.27015	7.53	K1V	0			6.36892	2.60875	3.25654	14.7917
8102	Tau Ceti HIP8102	0.3	26.02136	-15.9396	3.65	G8.5V	4			3.15389	-1.00237	1.60128	12.27753
7918	HIP7918	6.1	25.44382	42.61381	12.74	G1V	0			8.46641	8.62566	5.47343	20.23804
3093	54 Piscis HIP3093	16	9.842061	21.25137	11.06	K0V	1			10.15621	4.00881	1.89052	17.6412
15510	82 Eridani HIP1551	11	49.97177	-43.0715	6.04	G8V	3		C	2.83779	-4.12478	4.62499	7.99734
10138	HIP10138	0	32.60001	-50.8253	10.78	G9V	1			5.73675	-8.35691	5.80795	4.59407
12843	Tau(1) Eridani HIP1	3	41.27492	-18.5727	14.21	F7V	0			10.12338	-4.52598	9.37395	8.96263
15330	Zeta(1) Reticuli HI	3	49.43529	-62.5769	12.01	G4V	0			3.59704	-10.6604	9.12366	3.29E-02
15371	Zeta(2) Reticuli HI	3	49.5464	-62.5079	12.03	G0V	0			3.6032	-10.6715	9.15401	0
29271	Alpha Mensae HIP	5.8	92.55918	-74.7525	10.2	G7V	0		C	-0.11978	-9.84095	10.18983	3.95263
7235	HIP7235	0	23.31515	-24.1776	19.05	G8.5V	0	1	M	15.95981	-7.80223	7.53977	12.78767
11072	Kappa Fornacis HIF	5.7	35.63509	-23.8163	21.95	G1V	0		D	16.32059	-8.86354	12.78853	13.34955
111170	HIP111170	3.7	337.8259	-6.55489	25.4	F8V	0		C	23.36769	-2.89954	-9.58652	28.32395
115126	94 Aquarii HIP1151	0	349.7771	-13.4584	21.05	G8.5IV	0		D	20.14695	-4.89918	-3.73591	21.75237
113421	HIP113421	7.5	344.5648	-2.39535	19.86	G8IV-V	2		C	19.12696	-0.83004	-5.28572	23.37408
3909	Phi(2) Ceti HIP390	1	12.53218	-10.6438	15.75	F7V	0		C	15.11022	-2.90906	3.41756	15.01912
9007	Chi Eridani HIP900	0	28.9868	-51.6096	17.85	G8IV	0	1	U	9.69653	-13.9908	8.65026	6.95701
7978	HIP7978	1.9	25.62146	-53.7406	17.43	F9V	1		C	9.29518	-14.0546	7.53714	6.81604
99572	Xi(2) Capricorni HI	2.5	303.1073	-12.617	27.7	F7V Fe-0.	0		C	14.76463	-6.0506	-23.2029	34.53836
101345	HIP101345	7.8	308.098	-9.85364	24.4	G2V	0		C	14.83291	-4.17562	-19.2018	31.18256
102203	HIP102203	4.4	310.6227	-5.30082	30.63	G5 V	0		C	19.85713	-2.82975	-23.2486	37.08924
7513	Upsilon Andromed	3.1	24.1999	41.40638	13.49	F9V	4			9.22884	8.92222	5.52984	20.705
114703	HIP114703	0	348.5303	-8.9312	24.86	G0V	0		D	24.06815	-3.85947	-4.9434	25.76732
26737	HIP26737	7.7	85.21669	-31.3502	37.53	G2V	0			2.67263	-19.5256	37.39929	29.61516
101933	HIP101933	0	309.8454	11.71249	39.19		0			24.58694	7.9556	-30.0891	48.24221
22451	HIP22451	1.4	72.46813	-35.1074	17.74	K2 V	0			4.37174	-10.2025	16.91597	7.81401

Star selection criteria

In lieu of additional data, it is probably safe to presume that life, at virtually all levels, and manifestations, exhibits a “Normal Distribution” across stellar class. Taking Sol/Earth as the only reference extant and applying the standard distribution we should find that stellar class “G5” is the center of our curve, and “M” class and “A” class as our extremes.

As stars become smaller and colder (progression of “M” class), the planets become tidally locked. While this doesn’t eliminate the probability of life, it will certainly affect the rate at which that life evolves. Thus even after 10’s of billions of years the life may not become advanced.

Conversely, as a star progresses toward class “A”, its life span shortens and any life developing will experience a shortened “evolution time”.



The advanced, nearly space faring species found on Earth took 4.6 billion years to evolve. A similar "track" should be presumed for all other planets until better information is available.

It is said that the source of the Hill Template was visitors from Zeta Reticuli; Zeta(s) Reticuli are estimated at 3 billion years (7.1 max) which may help to establish a lower limit for evolution time.

Thus the fundamental criteria for star selection is; be of stellar classification "F", "G", or "K", and 3 billion or more years old.

Many of the thousands of available stars are "disqualified" early due to their "type" (as differentiated from "class"). For the most part only type "V" (main sequence) stars are suitable, other types indicate a dying star; for instance, a type IV star is called a "Sub giant". In a type IV star; its internal structures have collapsed, and the star actually shrinks a little. Over a short time the star enlarges and engulfs its inner planets. We don't seem to have much data on the dying process…yet. For instance; how long does a star remain in the different states of "dying"? Could a star remain in the "Giant" state long enough for life to evolve to an advanced level?

Math

So now, the big question; "What is this template Betty Hill gave us 50 or so years ago?"

We have seen than if applied to the local stars (within 33 parsec) that there is what appears to be a very close match, but, what of the chances of this being a random event?

We have a collection of 25 identified stars that conform well to the Hill template; applying probability…

We need to find the probability of this as a random event. As we have a collection of 25 out of 2826 stars our probability is:

$$C(n,r) = n!/\mathrm{r}!\,(n-r)!$$

$$p1 = 1/C(n,r)$$

Where:

C(n,r)	Number of combinations of r objects out of n.
p1	Probability of a match.
n	Number of objects to select from.
r	Number of objects selected.

This probability is however a bit out of context, we need to find the probability that at least one (1) match might be found. That probability is:

$$p = 1 - (1 - p1)\hat{}C(n,r)$$

Where:

p	is the probability of finding at least 1 match.
p1	is our probability from above.
C(n,r)	is the number of combinations.

C = 1.1026076447105967557166786340039e+61
p1 = 9.0694092753408366473070162288531e-62
n = 2826
r = 25

P = 0.0E0

This indicates that we should have no expectation of a match between any collection of 25 “dots” and actual stars.

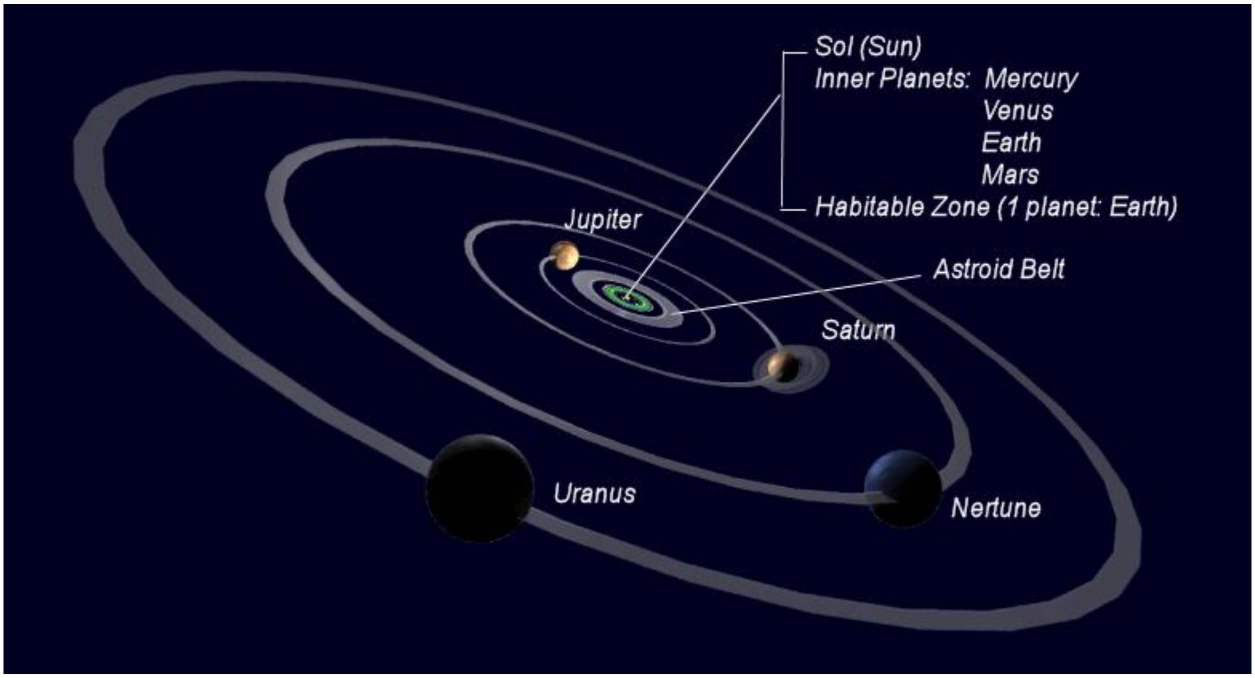
So our estimated a probability is p1 = 9.0694e-62

Vanishingly small.

Stars and Planets

1. HIP 26737. This is the star from which the whole of the map is being viewed. HIP 26737 is a Class G2V, 7.7 billion year old star 37.63 Parsec (121.9212ly) from Earth. Little is currently known about this star.

2. SOL. Earth’s own star, a Class G2V, 4.6 billion year old star some 93,000,000 miles from Earth. Sol has 8 planets, 4 inner rocky planets, at least one of which supports a virtual space faring civilization, and 4 outer gas giants, which have moons that may support life as well.



Planets:

Mercury:

Distance: 0.4 AU
Orbital Period: 87.97 Days
Size: 0.055 Earth Masses

Venus:

Distance: 0.7 AU
Orbital Period: 224.7 Days
Size: 0.815 Earth Masses

Earth:

Distance: 1 AU
Orbital Period: 365.256 Days
Size: 1 Earth Masses

Mars:

Distance: 1.5 AU
Orbital Period: 686.97 Days
Size: 0.107 Earth Masses

Jupiter:

Distance: 5.3 AU
Orbital Period: 11.862 Years
Size: 318 Earth Masses

Saturn:

Distance: 9.5 AU
Orbital Period: 29.457 Years
Size: 95 Earth Masses

Uranus:

Distance: 19.2 AU
Orbital Period: 84.02 Years
Size: 14 Earth Masses

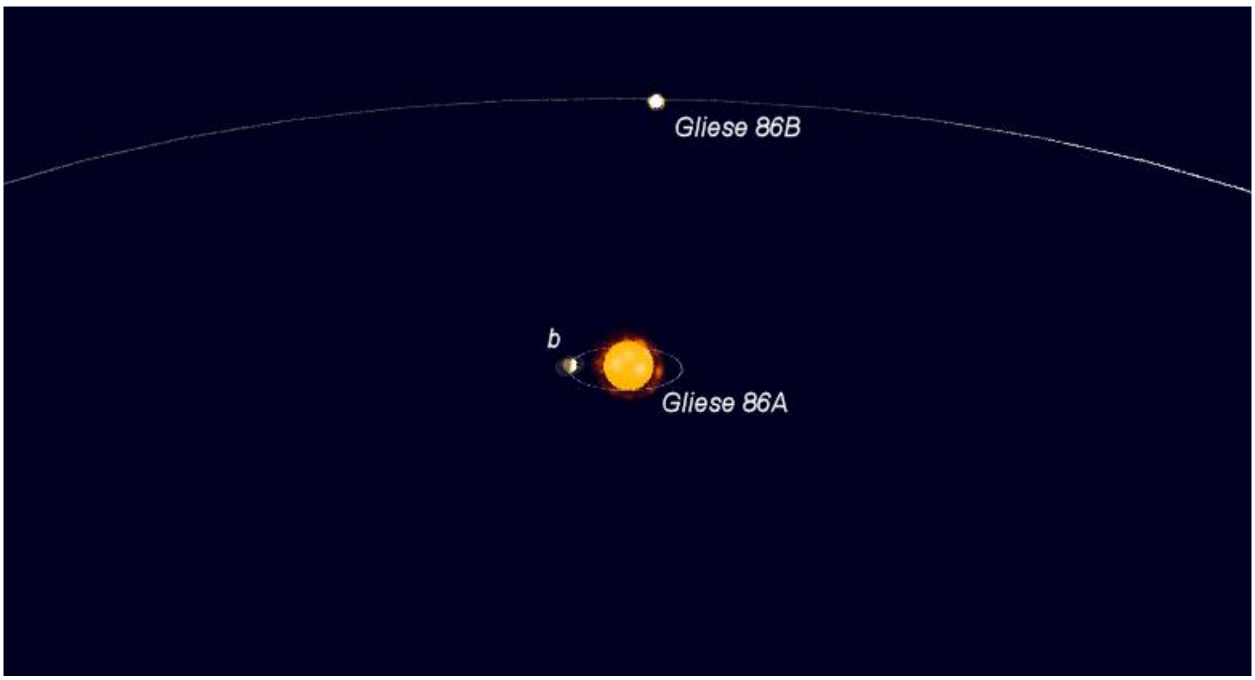
Neptune:

Distance: 30.1 AU
Orbital Period: 164.8 Years
Size: 17 Earth Masses

3. Zeta (1) Reticuli One of our two "Origin" stars. Zeta(s) Reticuli are a binary pair of stars. Zeta (1) is a class G3 – 5V 31.6ly from Earth, there are no known planets. (GJ 136)

4. Zeta (2) Reticuli Our other Zeta. Zeta (2) is a class G2V star 39.24ly from Earth. There are no known planets, however, Zeta (2) does have a debris disk. (GJ 138)

5. Gliese 86 (primary) A binary system consisting of a class K1V (primary star) and a white dwarf class D?. The star system has one known planet orbiting at 0.11AU in an almost circular orbit of some 15.76 days. (GJ 86)



Planets:

GJ86b:

Distance: 0.1130 ± 0.0065 AU
Orbital Period: 15.76 Days
Size: >3.91 ± 0.32 M_J

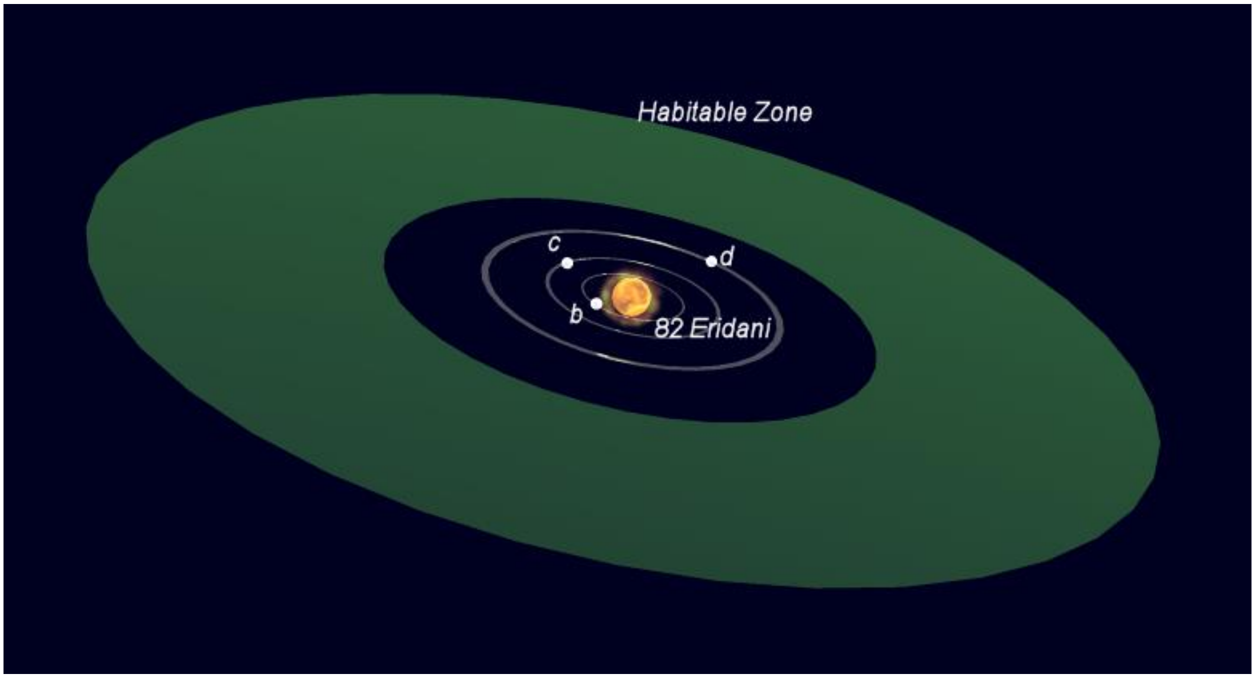
6. Tau (1) Eridani (primary) a class F7V, 46ly from Earth. This a spectroscopic binary with an orbital period of 958 days. There doesn't seem to be much on Tau (1)'s companion other than its long

orbital period, however with the length of orbit, it must be located a respectable distance from the primary star, and thus have little effect on any inner planets, should they exist. (GJ 111)

7. Gliese 59A (primary) Also HIP 7235, a class K0V (according to simbad) star located 19ly from Earth. There are no known planets. (GJ 59)

8. Alpha Mensae (primary) a class G7V star located some 10.2ly from Earth. There are no known planets. (GJ 231)

9. 82 Eridani (primary) a class G8V located some 19.7ly from Earth. 82 Eridani is host to 3 confirmed planets, and 3 unconfirmed. A potentially Neptune sized candidate planet, 82 Eridani f, is orbiting within the habitable zone of the star. (GJ 139)



Planets

82 Eri g: unconfirmed

Distance: 0.095 AU

Period: 11.86 Days

Size: 1.03 M_e

82 Eri b:

Distance: 0.1127 AU

Period: 18.33 Days

Size: 2.83 M_e

82 Eri c: unconfirmed

Distance: 0.225 AU

Period: 43.17 Days

Size: 2.52 M_e

82 Eri d:

Distance: 0.364 AU

Period: 88.49 Days

Size: 3.52 M_e

82 Eri e:

Distance: 0.509 AU

Size: 4.77 M_e

Period: 147.02 Days

82 Eri f: unconfirmed

Distance: 0.875 AU

Period: 341.41 Days

Size: 10.26 M_e

10. Tau Ceti (primary) Class G8V about 11.9ly from Earth. Tau Ceti hosts 4 confirmed planets, 2 of which are within its Habitable Zone. (GJ 71)

Planets

Tau Ceti g:

Distance: 0.133 AU

Period: 20 Days

Size: 1.75 M_e

Tau Ceti h:

Distance: 0.243 AU

Period: 49.41 Days

Size: 1.83 M_e

Tau Ceti e:

Distance: 0.538 AU

Period: 162.87 Days

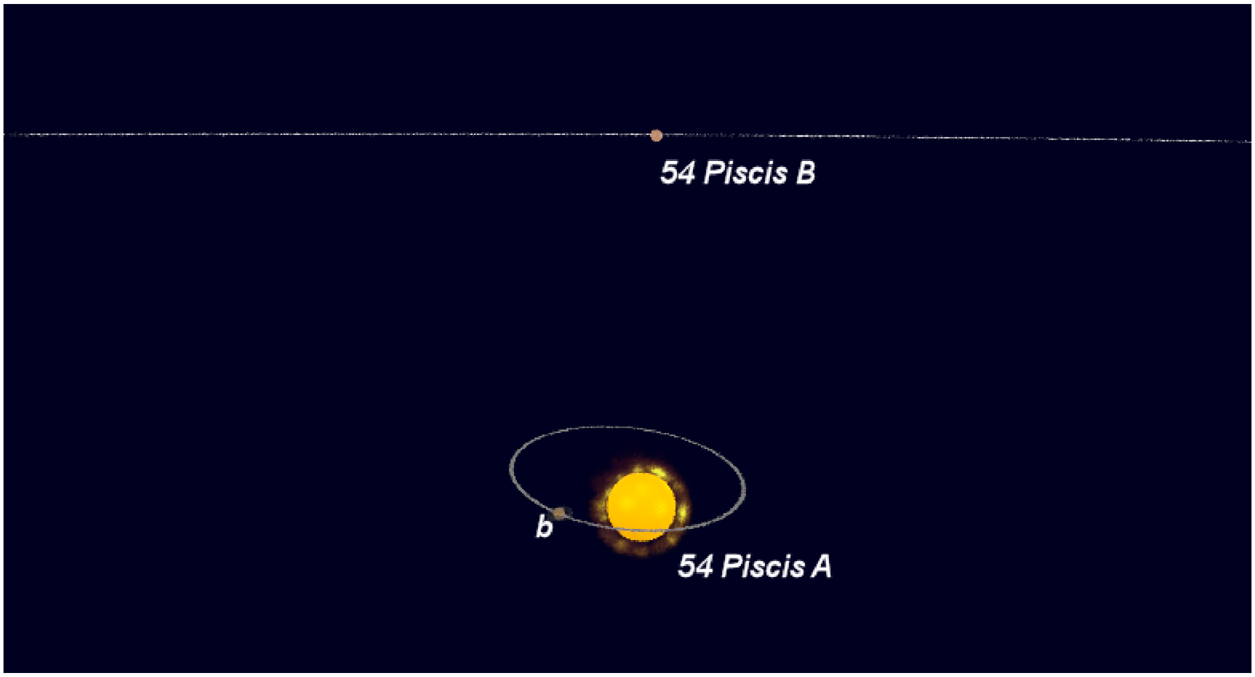
Size: 3.93 M_e

Tau Ceti f:

Distance: 1.334 AU
Period: 636.13 Days
Size: 3.93 M_e

11. 107 Piscis (primary) a class K1V star about 24.4ly from Earth. It has no confirmed planets. (GJ 68)

12. 54 Piscis (primary) Class K0V and T7.5 this binary system is located at 36.1ly has a single confirmed planet. It appears that the binary nature of this star wasn't known until after 2002. (GJ 27)



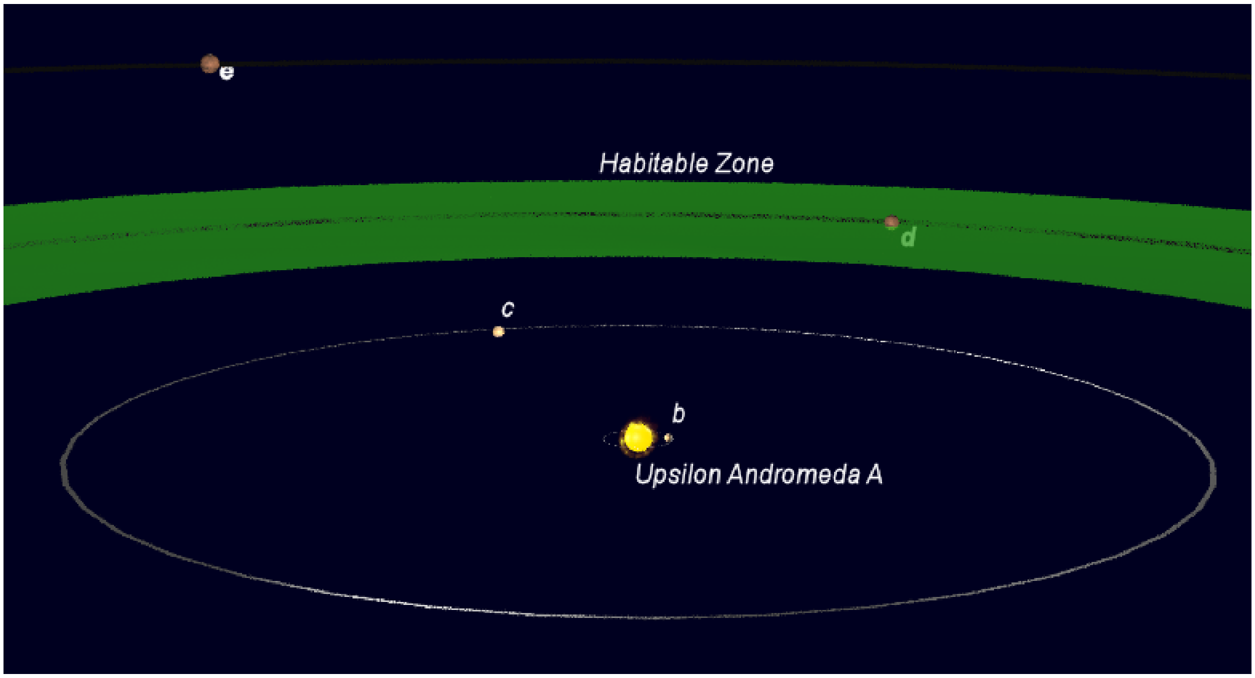
Planets

54 Piscis b:

Distance: 0.296 AU
Period: 62.206 Days
Size: 0.227 M_j

13. Gliese 67 a binary located 41.2 ly away, in Andromeda. The two stars orbit one another elliptically, approaching as close as 4.2 AU and receding to 10.5 AU, with a period of just under twenty years. There are no confirmed planets. (GJ 67)

14. Upsilon Andromeda a binary star system located about 44ly from Earth. Its class is F8V and M4.5V the separation of these stars is estimated to be around 750AU, which means the Red Dwarf companion would have no effect on any planets of the primary star. There are 4 confirmed planets. (GJ 61)



Planets

Ups And b

Distance: 0.059 AU
Period: 4.671 Days
Size: 0.62 M_j

Ups And c

Distance: 0.861 AU
Period: 240.937 Days
Size: 9.1 M_j

Ups And d

Distance: 2.55 AU
Period: 1281.439 Days
Size: 23.53 M_j

Ups And e

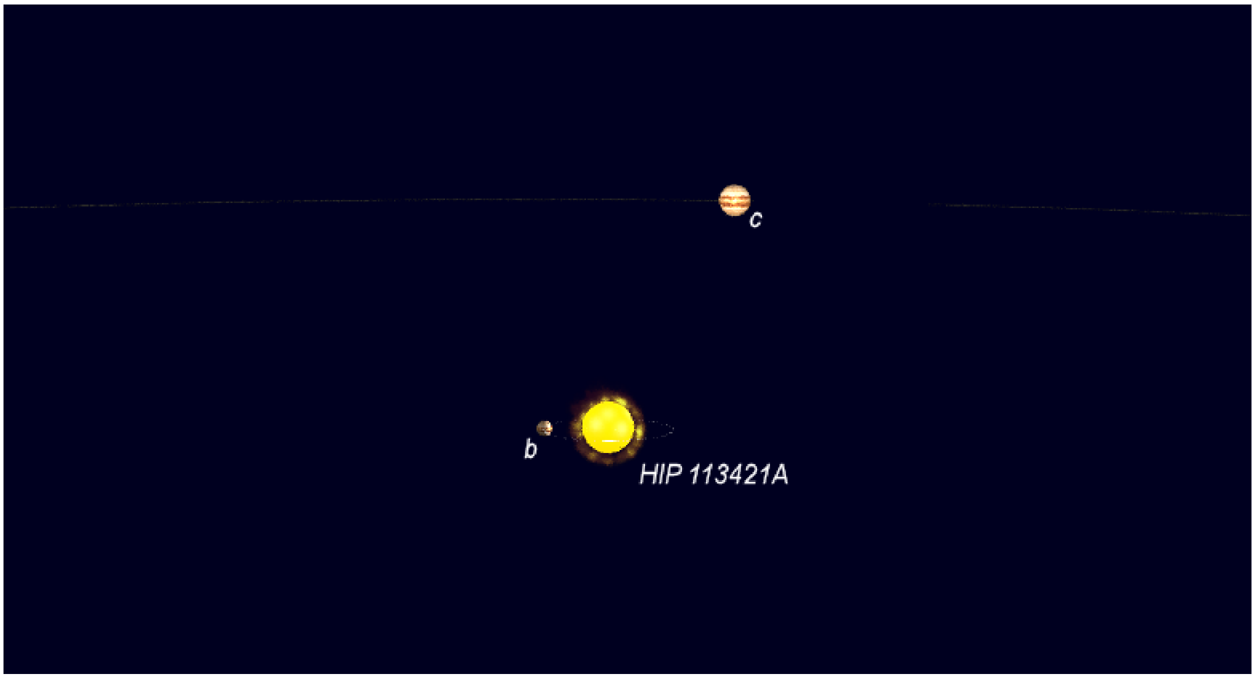
Distance: 5.2456 AU
Period: 3848.86 Days
Size: 1.059 M_j

15. HIP 22451 A class K2V located 17.7ly from Earth. There are no known planets. (GJ 3317)

16. Phi (2) Ceti (triangle) this class F7V star was misidentified by Ms. Fish in her late 60's analysis of Betty Hill's map. Ms. Fish thought it to be Kappa Fornacis, which while still belonging to this map, is not located here.

At 51.4ly this star is the correct designation for the "top" of the "triangle" object on Betty's map. There are no confirmed planets. (GJ 37)

17. *HIP 113421* (triangle) a class G8IV - V star 19.86ly from Earth. There are 2 confirmed planets. (---)



Planets

HIP 113421 b:

Distance: 0.073 AU

Period: 7.12689 Days

Size: 1.33 M_j

HIP 113421 c:

Distance: 5.27 AU

Period: 4210 Days

Size: 2.49 M_j

18. *HIP 101933* (triangle) a mystery star located some 39.19ly from Earth. This star is a mystery because there is very little data available on it. (---)

19. Kappa Fornacis (boomerang) has moved and become the lead star of out “boomerang” group. Kappa Fornacis is a multiple star system. The major star is a class G1V – IV star, it has two class M0V stars as companions. There are no confirmed planets. (GJ 97)

20. *HIP 114703* (boomerang) is a G0V, 24.86ly away. It has no confirmed planets. (---)

21. HIP 111170 (boomerang) a class F8V star 25.4ly from Earth. It has no confirmed planets. (GJ 862.1)

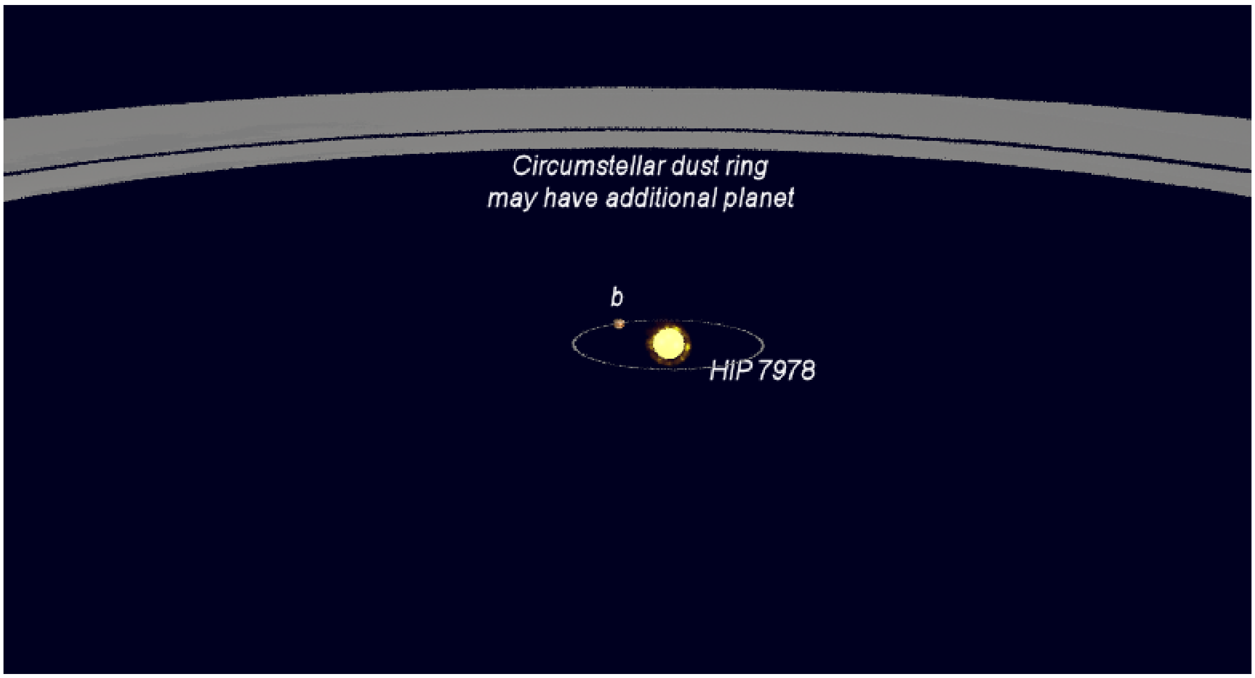
22. HIP 115126 (boomerang) (GJ 894.2 A) is a triple star system. The inner pair of this triple star system form a spectroscopic binary. The primary component of this pair has a stellar classification of G8.5IV, a subgiant star. The other component of this pair is a class K2V. No data on the third star found. Located 21.05ly from Earth, there are no known planets.

23. *HIP 102203* (pentagram) (---) Class G5V located some 30.6ly from Earth. There are no known planets.

24. HIP 101345 (pentagram) (---) a class G2V star located 24.4ly from Earth. (GJ 792.1 A)

25. XI (2) Capricorni (pentagram) (Gl 4139) is a class F7V star located 27.7ly from Earth. There are no known planets.

26. HIP 7978 (pentagram) (GJ 3109) Class F9V star located 17.43ly from Earth. There is 1 confirmed planet.



Planets

HIP 7978 b:

Distance: 2.03 AU
Period: 1003 Days
Size: 0.93 M_j

27. Chi Eridani (pentagram) (GJ 81) A class G8IV sub-giant star located 17.85ly from Earth. There are no known planets.

Pathways

Betty Hill described the map as “Trade and Exploration routes”. This would seem logical, though what Betty saw may not have been a navigational aid.

Beginning the two (2) pathways are two (2) of four (4) “trade” routes. Of these 4 routes only 2 have known planets, and only one of those is known to have life, and, that is the limit of our knowledge.

Falling back to our groups, two are of particular interest.

Route 1: Group 1, the “square root symbol” consists of 5 stars:

1. 82 Eridani: Class G8V, 11 billion years, 6 planets (3 unconfirmed), 26.05ly (from Zeta(2) Reticuli)
2. Tau Ceti: Class G8.5V, 5.8 billion years, 4 planets (2 in HZ), 40.019ly (from ZR)
3. 107 Piscium: Class K1V, 6.3 billion years, no known planets, 48.238ly(from ZR)
4. 54 Piscium: Class K0V/T7.5V (binary), 6.4 billion years, 1 known planet, 57.53ly
5. Gliese 67: Class G1V, 6.1 billion, no known planets, 65.98ly

Route 2: Group 2, our “greater than” symbol consists of three stars:

1. Gliese 86: Class K1V/D? (binary), 10 billion years, 1 known planet, 14.97ly
2. Tau(1) Eridani: Class F7V, 3 billion years, no known planets, 29.22ly
3. Gliese 59A: Class K0V, age unknown, no known planets, 41.68ly

Route 3: The Sun. Class G2V, 4.6 Billion years old, 8 planets, 1 advanced civilization.

Route 4: Alpha Mensae. Class G7V, 5.8 Billion years old, no known planets, 10.2ly

Predictions

It has been said that one of the things that can go a very long way to “proving” Extraterrestrial involvement with Earth and the abduction of Humans; is for an abductee to return with knowledge gained from the Extraterrestrials that is later proven by science. Such is the case here, there are 4 stars in the original map that were unknown until the Hipparcos Mission of the early 1990’s.

1. HIP 113421*
2. HIP 101933*
3. HIP 114703*
4. HIP 102203*

These 4 stars are identified in Betty’s original map.

Conclusions

Given the impossible nature of the task of creating a random grouping of stars that match actual stars within local space (33 parsec) without previous knowledge, and with features not yet known (binary nature of Zeta(s) Reticuli, several undiscovered stars). It would appear that the template is a close approximation (99.1%) of something real and provided by extraterrestrial visitors; making the template an artifact of Extraterrestrial visitation.

References:

Hipparcos Star Catalog; https://heasarc.gsfc.nasa.gov/W3Browse/all/hipparcos.html

The Extrasolar Planet Encyclopedia; http://exoplanet.eu