Most Mass-Dependent Isotope Fractionation is Due to Stellar Evolution (Planet Formation)

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Abstract: Isotope fractionation means the separation of specific isotopes of a specific element. Say, O-17 is heavier than O-16 so it will sink easier into a star because it is heavier. This is mass dependent isotope fractionation. Most isotope fractionation taught by mainstream only include mass independent fractionation, meaning they are searching for separation of isotopes without mass being a factor. In this paper it is explained firstly that lighter isotopes can escape the star, leaving heavier ones to sink. This leads to the idea that the large percentage of a galactic bodies' isotope fractionation is due to its evolutionary history, and is directly based on mass dependent fractionation. Explanation is provided.

It has been discovered that planets are older stars.[1] This means any isotope fractionation needs to be explained in terms of this discovery, first and foremost. Any talk of isotope fractionation on the whole of any celestial body without acknowledgment of its enormous evolutionary and/or destructive history will not be possible. A graph below is a rough estimation of the evolutionary paths of objects.

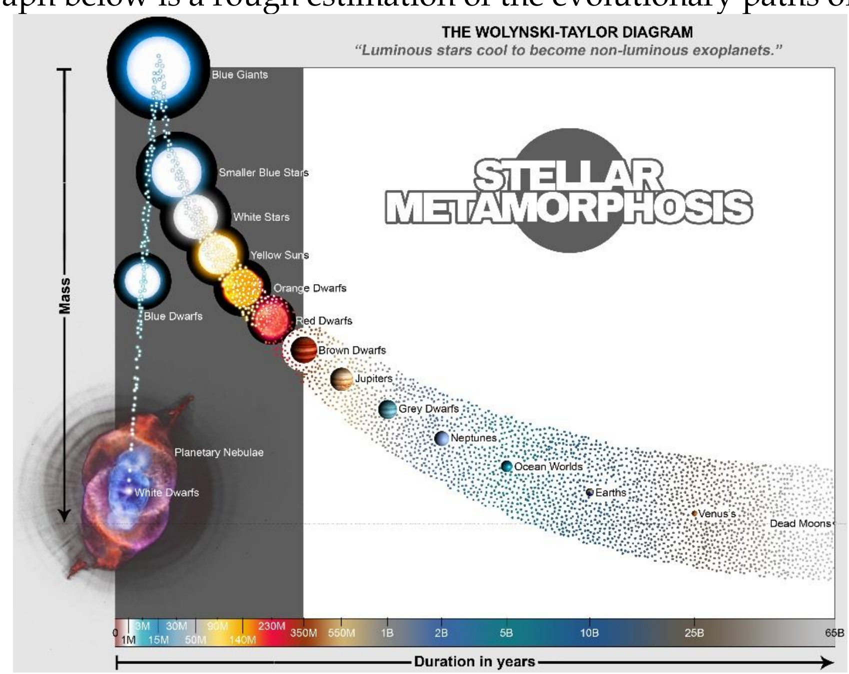

Illustration of Stellar Metamorphosis

No mainstream astronomy articles mention the importance of mass loss of stars as they become much cooler, less massive, no longer shining stars mislabeled "planet/exoplanet", nor do they mention how important mass dependent fractionation could be (and is) during this process. As stars lose their mass and evolve, the lighter isotopes of similar stable elements can escape in ratios that grow as the mass is lost. For instance, an object like the Sun could have a very low ratio of D/H, deuterium to hydrogen, meaning there is a lot more hydrogen as opposed to its heavier isotope, deuterium. Though, as the Sun evolves into orange dwarf stages, the heavier deuterium will sink into the Sun, and the lighter hydrogen will escape in larger numbers. This means the ratio of D/H will increase. Eventually the D/H ratio will be that of an intermediate aged star such as Jupiter. As Jupiter cools and collapses losing more lighter hydrogen than deuterium, the latter will combine with oxygen and form water. This means heavier water should be expected on extremely evolved stars such as the Earth, which is also interesting as heavier water than the Sun (solar wind) is actually observationally confirmed.[2]

Below is an illustration of the idea, note that there are two mass dependent fractionation variables. One is due to lighter gaseous isotopes being lost due to mass loss, the other is the heavier isotopes sink into the interior of the star physically separating themselves. Here is of course the other paper on isotope abundances and predicted values of Jupiter's atmosphere.[3] http://vixra.org/pdf/1707.0205v2.pdf An exaggerated illustration of the abundances differences between deuterium and hydrogen in the objects in our solar system and others is provided on the next page.

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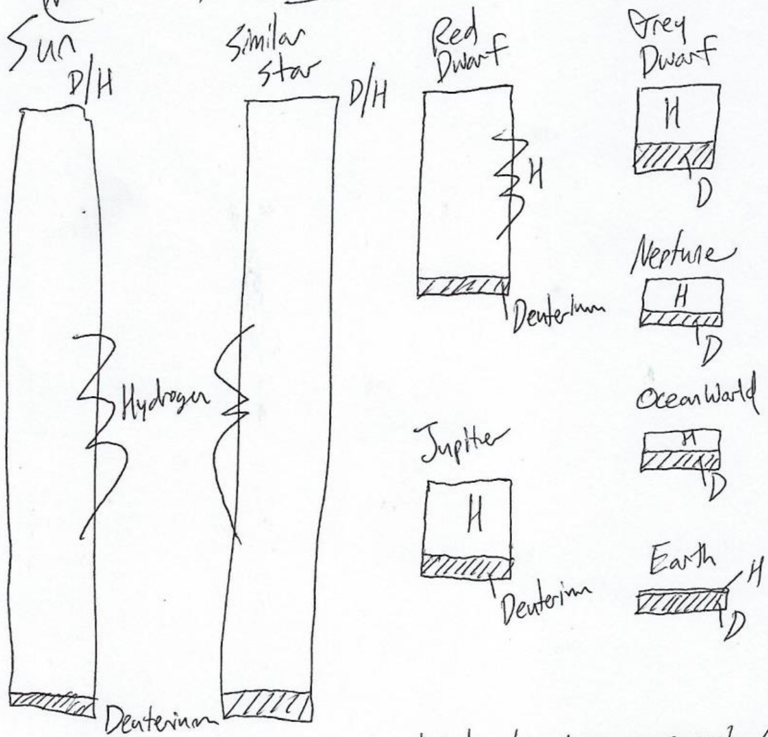
Mass Dependent Fractionation Due to Mass Loss

- More pronounced with lighter elements/isotopes
- can be haphazard (mixing due to orbiting another hotter host can ~~make~~ give measurements of mass independent fractionation more importance)

Example (not to scale) (exaggeration)



1. As mass is lost in total, heavier components (isotopes) will make up larger percentage!
2. As well, lighter isotope gases will escape easier too!

[1] http://vixra.org/pdf/1711.0206v4.pdf

[2] https://dtm.carnegiescience.edu/news/earths-water-older-sun

[3] http://vixra.org/pdf/1707.0205v2.pdf