Term Project Universe Planning
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Simulated Universe

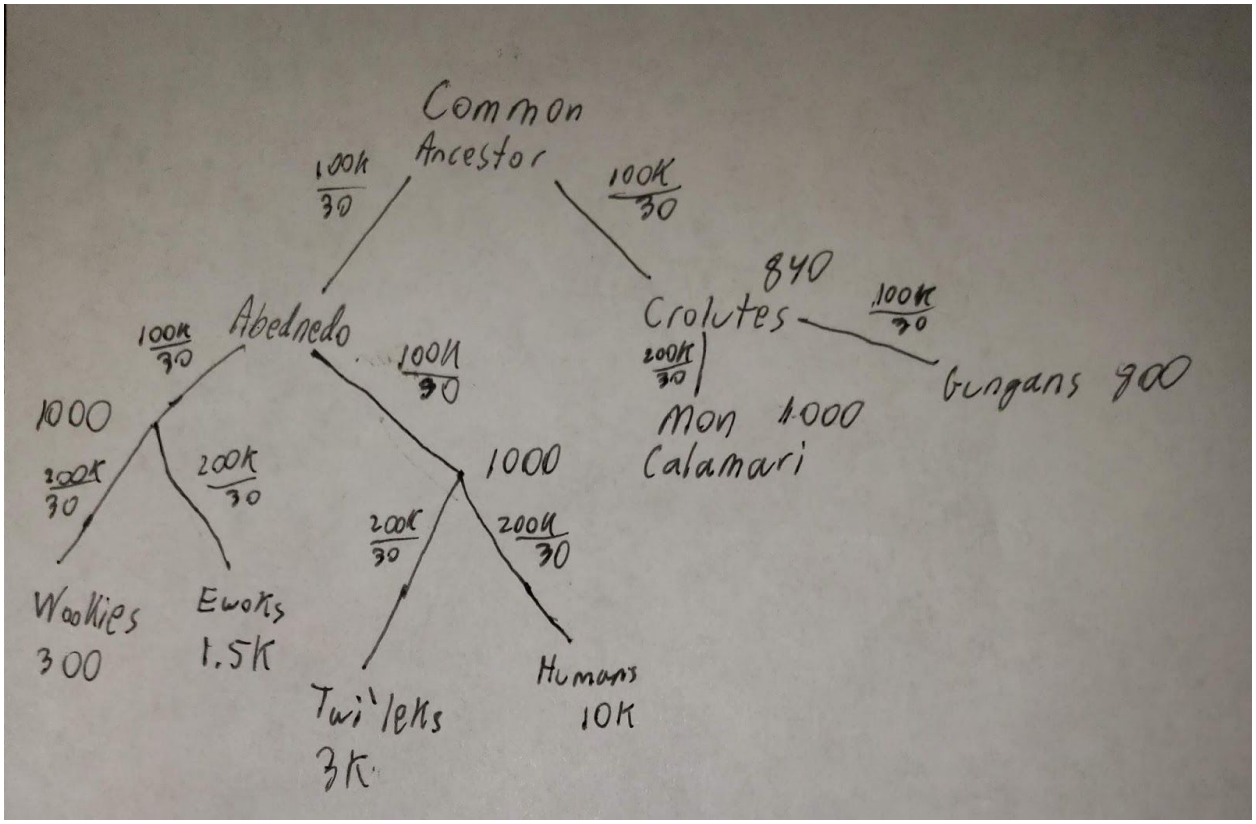
The fictional universe we will be simulating is the Star Wars universe. Created by George Lucas in the 1970s, it is a sprawling galactic epic that has become the basis of many films, books, and attractions. In an unnamed galaxy (far far away), there are many planets with a large variety of unique life forms, and the events within this galaxy and interactions between its species form the plot for this universe.

Population History in the Star Wars Universe

Our research indicates the two earliest species in the universe are the Abednedo and the Crolutes, with some unknown common ancestor. We've chosen to model these populations as all having a common ancestor, because there is no indication that life evolved independently on each of the planets, and colonization is mentioned very early on. The Abednedo were a mammalian species, and the Crolutes were amphibious. As such, we have taken those two to be the common ancestors for the mammalian and amphibious species, respectively. Because the number of different species in this universe is so vast, we've chosen to focus on the ones that have been more prominent in popular culture.

Descended from the Crolutes, Gungans and Mon Calamari are both amphibious-humanoid species, having diverged about a million years ago. The Gungan's population size is quite small, due to historical events. Colonization of their home planet Naboo led to a drastic reduction in population size from 800 to about 200 several thousands of years ago. Over time, their population has been able to swell back up to 400.

Moving on to mammals, the descendants of the Abednedo branch into humanoids with and without fur. Furry mammals include Wookies and Ewoks. Wookies and Ewoks both have relatively small population sizes, though for different reasons. Wookies have historically been oppressed, but more recently, their population has shrunk dramatically due to war and enslavement of their people on their home planet by a tyrannical government, the Empire, in the last few decades. Due to this historical oppression and enslavement, their population has shrunk from about 1,500 to 300 over the past few thousand years. Ewoks have been relatively untouched on their home planet and have maintained a small population size. Humans and Twi' leks constitute the non-furry mammals. Humans are one of the more far reaching species, making use of the development of hyperspace travel to colonize planets far from their home planet and have a large population size because of this. Over the course of their history, they've swelled from 1,500 to 10,000. Twi'leks, like Wookies, have also faced recent oppression from the Empire, as their people have also been enslaved, leading to a decrease in population size from about 4,000 to 3,000 in more recent history.



Population History Tree: k is thousands; interpret times, adjacent to lines, as in generations, and numbers below/adjacent to species names as modern effective population sizes. It is assumed that, for each (sentient) species, there are about 30 years in a generation, so the numerator of times given is in years. Times listed refer to the change from one species to the 'next'; they do not refer to the present. Consequently, the line from humans to the common ancestor is 400,000 years, whereas the line from Gungans to the common ancestor is only 200,000.

Genes Under Selection

Respiration - Having both amphibious and mammalian species, at some point, genes controlling respiration (underwater vs. not underwater) must have been under strong selection.
Potential Genes: angpt2 - encodes a protein found only at sites of vascular remodeling; vegfa - a growth factor for vascular endothelial cells, essential for angiogenesis

Fur - Presence of fur in some individuals could have governed the separation of Wookies/Ewoks from other mammalian species. Additionally, Twi'leks have absolutely no other hair on their skin besides eyelashes.
Potential Genes: HR - encodes a protein for hair growth

Size - Particularly in the Wookie and Ewok species, size appears to have been under strong selection as Ewoks are nearly universally around 3 feet tall and Wookies are known for being substantially taller than average human height.

Potential Genes: FBN1 - codes for fibrillin 1, which form microfibrils, which, in turn, house TGF-beta, a growth factor

Eye shape/placement - While Crolutes do not have protruding eyes, their descendents, Mon Calamari and Gungans do, and these varied and pronounced eye shapes and placements could have been essential to speciation.
Potential Genes: PAX3 - paired box 3, involved in face shape

Skin color - While both Twi' leks and humans have a variety of different skin colors within their populations, the colors are distinct between species (with minimal overlap), and so there must have been some selective force driving this speciation.
Potential Genes: OCA2 - melanosomal transmembrane protein, MC1R - melanocortin 1 receptor

Head shape - Most of these species have basically human-shaped heads - round/ovular, with some notable exceptions. Particularly on the amphibious side, mon calamari and gungans each have very unique head shapes, indicating perhaps some selective importance. Additionally, Twi'leks have long appendages protruding from their skulls, called lekku, providing further evidence of selective importance.
Potential Genes: UBR4 - ubiquitin protein ligase E3 component n-recognin 4, PHLPP1- PH domain and leucine rich repeat protein phosphatase 1

Comments

Some events taking place within the Star Wars universe could have an impact on how we simulate these populations. For example, the introduction of hyperspace travel in the universe would allow for much more rapid and far-reaching mixing of populations and population splits. This is something that could be played with in a simulation. Additionally, as stated in the population history, population sizes were also largely impacted by the events around the tyrannical government of and wars of the Empire in more recent history. This will be reflected in population sizes/size changes in our simulation.

It's also noteworthy that each species in this simulation are intelligent; individuals within populations can look out for each other. Their civilizations have high-quality infrastructure, so individuals who would be less likely to survive independently may have higher effective fitness as a result.

References:

Universe Timeline:
https://starwars.fandom.com/wiki/Timeline_of_galactic_history

Universe Species Description:
https://starwars.fandom.com/wiki/Species/Legends

https://www.denofgeek.com/games/star-wars-the-evolution-of-the-25-greatest-alien-species/