Chapter 3 – YazeShepherd

Associate Professor YazeShepherd gazed into the area that was reserved for the Plain Sloths. It was just one area of the expansive and relatively new SouthCentral City zoo. Being only the second of the new class of permanent and publicly accessible *zoos* in Necedah, it had only opened a couple years ago. For a public hungry to know about their world, these new zoos were a great improvement over the menageries of traveling animals or private collections.

In the short time the zoo had been opened, Professor YazeShepherd found he had settled into a pattern of spending a fair amount of time there. Being that he was a professor in the School of Animal Studies as SouthCentral University, most people would not find that all that unusual. But in reality, he didn't accomplish much professionally here, he just found it relaxing and allowed him time to think without being interrupted like he found would constantly happen at the University.

Today wasn't the best day to be here. Being midday on LowSun day, there was a slightly larger weekday crowd than typical for winter. People like him who had taken this day off to have some personal time. While he would have normally found the larger crowds distracting, today he had a lot on his mind, which helped him tune out those around him.

Professor YazeShepherd's specific area of expertise was animal populations – how many there were, how many the land would support, how fast were they growing, what were their birth and death rates, etc. He had decided to pursue these studies after growing up watching his father and grandfather and great grandfather tend to large herds of commercial Yaze and seeing them toil to assure they were grazing them over large enough areas and keeping them feed a sufficient supplemental diet while getting the exercise a Yaze needed to stay healthy.

His current focus of study was the rate of growth of animal species throughout habitable Necedah. His area of study, like many others that had come into being since the start of the Age of Discovery, was relatively new. As such, there was very limited historical research, and even less historical data. Much of his particular science was based on data. However, since there was so little of it, most of the theories – really hypothesis – were based on 9 parts conjecture and 1 part facts. At this point, as much as he hated it, the discipline was more philosophical than scientific, and would continue to be until more data was available.

He felt very uneasy that a branch of science that should be based on facts was, instead, so based on what people thought. He had devoted his life to changing that; to gathering as much data as he could and make theories based on hard evidence and numbers.

Which lead him to his current perplexity.

It was widely known that there were, generally speaking, a far greater number of faster animals than of slower animals. The current wisdom was that the greater speed gave them more access to resources and opportunities, and therefore there were more of them. But Professor YazeShepherd didn't buy it. He just didn't think that made sense. Just because an animal was faster didn't mean it had more advantages than another slower animal that filled a different niche in nature. Moreover, habitable Necadah was vast, about 50,000 KL by 100,000 KL, or 5 billion KAs[21], with plenty of opportunities for all classes of animals. Why would speed be such an overwhelming benefit over strength or flexibility, or natural protection, or size, or a dozen other attributes? He just didn't see it.

So, he had started looking at population size from many different angles. How did population size vs. lifting strength, pulling strength, mass, height, length, density, and a few other measures, relate to each other. He found that all of the relationship correlations were largely gibberish except for speed which clearly had a relation. He then went in the other direction and focused in on speed. He then plotted population size against short distance speed (fastest an animal could go), medium speed (how much they could travel in a day) and long distance (how far they could travel in a dY).

He spent nearly 2 years collecting data on the last two measures for a dozen different species, as no one had ever scientifically collected that data before. But it did pay off. Population Size vs fastest speed definitely showed a correlation, but was rough. Medium speed was better. But long-distance speed showed the cleanest RMS trend line of all of them. But he still couldn't really understand why.

So he then took it in a slightly different direction. Rather than population size, he looked at from population growth rates of wild animals. The populations of the fastest animals such as those of the Yaze family were thought to be essentially stead state, with the death rate roughly matching the birth rate. There were probably several 10s of billions of Yaze over Necedah. Enough so that they could overgraze entire regions causing hunger and early death among the local herds, leading an overall equilibrium to be established.

[21] 1 KA = 1.058 sq. miles; 5 billion KA = 5.288 billion sq. miles (All land on earth = 0.2 billion sq. miles)

But just about all slower animals were still growing in population sizes, some quicker than others, but again usually related to how fast they traveled. But instead of looking at the absolute numbers, Professor YazeShepherd looked at the *growth rate* for the species; their percentage growth per year. Unfortunately, that was a hard umber to come by. The professor had to scower the published papers and materials from all the Necedah Universities to find population estimates over time. In most cases he would only find one population size of a species recorded for the region. In many cases, none. But in a few places, he found two estimates at different times allowing for a crude growth rate estimate. In a few rare instances he found 3 or more, allowing for an even more accurate estimation.

Of course, finding this data wasn't easy. Although he had the research libraries of the close by SouthCentral University, getting the research from other Universities was far harder. Between sending the request and getting the documented studies, it could take a Y or more. However, over the course of about 6Y, Professor YazeShepherd was able to get very crude growth rates of almost a one and half dozen species.

When he plotted growth rate against long distance speed, he was sickened. There seemed to be no correlation. Was all his time wasted? He then took the growth rate and compared it against all the earlier attributes: strength, size, etc. Again, no correlation. He fell into despair.

Almost out of desperation, he started looking at other comparisons. Growth rate against population again wasn't all that useful, other than you could see the decline in growth rate as you got to the near or at equilibrium larger populations. But it was enough of some relation to make him look deeper.

So, he started looking at other possible calculations that he hoped might prove interesting. He looked at the population saturation percentage vs. growth rate and population – nothing. Total mass of species versus population growth – nothing. Average annual roaming distance vs population growth – nothing.

Dejected, he went back to his growth rate vs. population size charts. As he stared at it for hours, his eyes saw nothing, but he sensed something there. Not really understanding how he logically got there, he started a new and somewhat distant relationship calculation. He took the growth rate against the population size and calculated the day-one of the species. That is, when, according to the math, there would have been just two of the species (presumably male and female). He then did this for all the species for which he had data and plotted it on a graph. Then something unexpected jumped out at him.

Of course, the day-one date for species in equilibrium was infinity. For near equilibrium species it was very long ago. And as the population sizes went down, the day-one date became closer and closer. It was as if the faster animals had been created before the slower animals. But looking at the graph, it was very clear that there was an asymptotic day-one date of about 4000 years ago. Moreover, the smoothed graph line approaching the asymptotic leveled out about half way through the species so that those had a day-one date of between 6000 and 4000 years ago. The only oddity was if you put man in this graph too. Even though man was twice as slow as any other species (even the plain sloth could easily outrun a man over a dY of motivated travel), they had a day-one date of almost 20,000 years ago, which was clearly an abnormality on the graph.

Of course, he had much better growth rate data on man, and knew how it changed over time, going back to the start of written records. He wished he had better data on the other species. If he just had a few more data points, he could be much better estimates. If he had enough data to get the first derivative of the growth rate, or the rate of change of the growth rate, he could be more accurate. It would be even better if he had the second derivative of the growth rate, or the rate of change of the rate of change of the growth rate. He felt strongly that with that data, he could much more accurately calculate the day-one date of even the near equilibrium species. But it would be many generations before they would have that much data collected to make that leap.

Nonetheless, he finally had something that laid out a mathematical reason for the different population sizes – they started at different points in time. But, of course, that was absurd. Necedah had been here for many millions of years or more. What had happened 5ish millennia ago that these populations started from scratch? And why did the slower ones appear to start more recently? Maybe it was just the data he had. But why would it be so consistently slighted?

He was very perplexed.

He contemplated trying to publish a paper on his finding and seeing if anyone else could make better sense of it. But with the SouthCentral Science conference just 2 ½ dY away, it would be much more fun to hold a local session with other interested scientist on his findings and discussing it among themselves. He was really looking forward to that conference.

