Brain Gut 1: Who Are We, Really?

READERS SUMMARY:

1. WHY CAN'T FOSSILS, BIOCHEMISTRY, TEETH, GEOLOGY, PALEOANTHROPOLOGY TELL US WHERE WE CAME FROM?
2. ARE WE REALLY PILOCENE OR PALEOLITHIC BEINGS?
3. DO WE STRADDLE THE FENCE OF BOTH ERA'S OR IS ONE MORE IMPORTANT?
4. HOW MIGHT NEUROSURGERY GIVE A NEW PERSPECTIVE TO THESE MYSTERIES?
5. IS HOMO HERE BECAUSE OF VIRAL MARKETING?

If you are paleoanthropologist or archeologist you think fossils are the Rosetta Stone for discovering the path that human evolution took. If you are proteomic evolutionary biochemist you think molecular arrays are the best way to decipher the tea leaves of Mother Nature ways. If you are a geneticist you think the RNA/DNA is Holy Grail of human evolution. If you are dental specialist, like University of Arkansas professor, Dr. Peter Ungar you think it's all about the mammalian teeth. Today's blogosphere likes to define evolutionary thinking by thinking about the Paleolithic epoch and how it might have shaped the hominid tree. The paleolithic shaped the tree to be sure, **but had nothing to do with planting the acorn.**

The paleolithic diet has been championed best, in my view, by Dr. Loren Cordain's sustained efforts over the last 30 years. His work is epic and quite important in point out that Paleo man was far superior to modern man today. But I think this diet was not foundational nor optimal for the initial stages of hominid evolution. This also begs the question, was there a

diet before the paleolithic that maybe better for us even today? How might we study that?

My opinion is that we need to look back further to the transition from ape to Australopithecus afarensis is far more important for what maybe Optimal for our version of Homo today. Many of these experts believe that evolution has a purpose as it works. I do not believe this. I think Heisenberg had it dead right in 1925 when he said all life was random because of his uncertainity principle he found in quantum mechanics. Einstein was vexed by this question the rest of his life. He was often quoted saying he did not believe life would be left up to just a roll of the dice. This is one time I think Einstein was dead wrong.

Since I am a neurologic surgeon who does a lot of spine surgery I have a decidedly different view point than most of the experts listed above who are interested in human evolution. The main thing that separates ape from man is his brain, his spine and their guts. The clinical significance is the major difference in these body parts, and I believe, is not what you may have been led to believe from many in the blogospshere on this topic. I come from a completely new perspective on this rather controversial and speculative issue. My unique perspective on these problems opens up new worm holes for you to explore. I believe the answer to human evolution is not found in any one single answer or theory. I think parts of theories are spot on and need to be assimilated and reshuffled. into a new line of questioning or new theory formation.

Answers are someone’s terminus’s explanation of an existing mystery. Theories are someone else’s answer, and in my view answers usually lead to dead ends. In this series I am going to focus on questions for you to ponder. Questions open mindful inquiry and may suggest that your mind expands in ways it may never have done before. I am going to take many known facts today and I am going to connect the dots for your own

mind to explore. I will not invent any new theory here. I think my theory of life is built into the the Quilt document. Instead, I will innovate on homo evolution to help modern humans regain their health by putting concepts together that may lead us all to some new conclusions about what is Optimal for us today.

The focus of this series is to ask better questions than the answers the experts have given us to solve the puzzle of human evolution. I am going to share with you the evidence I have amassed in my brain that has allowed me to think about how disease may be the evolutionary building blocks of the homo species. **If my instincts are correct, this has huge implications for how we treat modern humans in modern healthcare.**

Ironically, I think the embryology and radical transition of the paracellular pathway of our gastroenterology tract holds the key to the transition. This series is called the Brain Gut series so let us begin to explore the mysteries with some questions of our own.

What are the main differences that separate humans and apes?
How did we acquire them?
What were the factors at play?
What might the ramifications be as time moves on?
WHO ARE WE REALLY?

How humans acquired this paracellular pathway in our guts however may shock you. In this series I am going to kick down some new doors and stir the pot of modern evolutionary dogma as it stands today. It is time to paint a picture of human evolution that incorporates all the problems with all the theories that are out there to offer a new perspective on an age old problem. Many will complain and call me nasty names because I think differently as they have been apt to do this year to be sure as I lay it out. But for those of you who enjoy deep thinking, these ideas will really make you think

about who we really are and why did we come from who we did. I expect to take you to places heretofore that few have gone yet.

WHO ARE WE THEN?

The transition from chimp to human happened rapidly in the East African Rift Zone based upon the data contained in multiple branches of science we have today. It happened much more quickly than most of the “so called experts” guessed in the last century. We found that out recently because of modern genomic arrays that 7{a7b724a0454d92c70890dedf5ec22a026af4df067c7b55aa6009b4d34d5da3c6} of our genes have been altered just in the last 20,000 years. This amount of action is far more than any expert expected before this was found. In 1996, Boyd Eaton made the case that we should study man through the paleolithic optic because paleolithic man was clearly healthier than their modern descendants. His arguments were good, if you want to compare modern man to paleo man, but the arguments do not take us back to where we really became human from being ape. I’m more interested in how a four legged, small brained herbivore became us, and why it happened. those answers, I believe will give us tremendous insight in how to tackle modern man’s health maladies. I think focusing in on the paleolithic solely is myopic for healthcare issues.

I want to know what environmental conditions and diet caused that quantum leap, because it maybe the the diet our species may fare best on even today. I believe we need to focus upon what environmental pressures caused us to break millions of years of mammalian spinal and cranial design to cause a massive epigenetic change in such a short period of evolutionary history. The paleoanthropology experts used bones and fossils to tell us about our evolution. They have believed since Darwin’s time that bones and fossils are the best evidence for human or human like life forms. In reality, when we rely heavily on bone evidence, we are drawing conclusions

using massive inferences. Why you ask? For hominids, the fossil record is quite poor in comparison to all other mammals, so why would it be foundational starting point? Because when humans began to study evolution bones were all we had. Today we have a lot more data, and in my view, we are not innovating our thoughts to ask better questions than the bone collectors are today. I believe the fixation on bones has stopped productive inquiry. They have wasted the last 30 years because they just can't lay their bones down in their boxes and find a new perspective. That is why we remain in the dark about who we really are.

This means we are making large leaps of assumption that are not fully supported even by the fossil record. This is especially problematic for in the study of the only bipedal primate in evolutionary history. Man is the only bipedal mammal that is terrestrial and we have **less then 10 good fossils of primate transitional feet** to draw these inferences upon how and why we began to walk upright on two legs. For me it seemed that using bones alone was not a good way to study this transition. Many of those bone experts had theories about where we came from and why it happened. We all know about the Savanna theory, the expensive tissue hypothesis, and even Hardy's the aquatic ape theory but those "expert theories" (insert Conventional wisdom here) all have major gaping holes in them. Why? I am going to examine them as the series rolls on and you will see where I think they went right and where they went very wrong.

Let's start with the bone collectors.

If you examine the fossil record as it stands today compared to other evolutionary trees, there is paucity of proof for any of them in the fossil record. When one considers that evolution has been speeding up as time elapses, it should be no surprise to the experts why the bones "just ain't there" and won't be found either, in my opinion. A sped up epigenetic program formed this new divide in the evolution of hominids,

so why would we find more skeletons? I believe if I am right we will find few. So far I think that is more correct than speculative. One of the things I realized years ago is that modern man has developed in the paleolithic time, but his most unique attributes formed in the the period before the “paleolithic.” This era is called the Pilocene.

Prior to the 2009 revision of the geologic time scale, which placed the 4 most recent major glaciations entirely within the Pleistocene, the Pliocene also comprised the Gelasian stage, which lasted from 2.588 to 1.805 million years ago. This is precisely were Homo showed up in the fossil record. I think we need to look right there instead. The first change that happened in transition, occurred because certain groups of apes were isolated by a changing environment fostered by some unusual geologic conditions that exist in this area of the planet. Do we know that happened in the East African Rift Zone back then, today? Yes, we believe we have a pretty good idea of what happened to apes when humans evolved in the environment. (The Vatican will not like this blog or series either, but I still go to church.)

The second change was that in the Pilocene we know the climate got **cooler and drier inside away from the coast, but more wet on the coastline due to rising sea levels** (anyone feeling that CT feeling) and began to approximate what we modern humans face on earth today. As with other older geologic periods, the geological strata that define the start and end are well identified but the exact dates of the start and end of the epoch are slightly uncertain. The boundaries defining the onset of the Pliocene are not set at an easily identified worldwide event but rather at regional boundaries between the warmer Miocene and the relatively cooler Pleistocene. The upper boundary was set at the start of the Pleistocene glaciations.

Here is what Wikipedia has to say about the 30,000 ft view of the Pilocene and it is not controversial.

“During the Pliocene epoch climate became cooler and drier, and seasonal, similar to modern climate.
The global average temperature in the mid-Pliocene (3.3 mya – 3 mya) was 2-3°C higher than today, global sea level **25 m higher** and Northern hemisphere ice sheet ephemeral before the onset of extensive glaciation over Greenland that occurred in the late Pliocene around 3 Ma. The formation of an Arctic ice cap is signaled by an abrupt shift in oxygen isotope ratios and ice-rafted cobbles in the North Atlantic and North Pacific ocean beds. Mid-latitude glaciation was probably underway before the end of the epoch. The global cooling that occurred during the Pliocene **may have spurred on the disappearance of forests** and the spread of grasslands and savannas.”

This represents a 30,000 foot view of what was going on in the Earth’s environment. The micro climate of the East African Rift is where we found the ideal environment to lead to homo speciation, in my view.

To get why humans ‘randomly’ came from apes we need to look at the cradle of man when the ape spine was radically changed to Australopithecus afarensis (Lucy) who walked on two feet. Up until very recently most bone collectors believed the brain co evolved with the rest of the skeletal data in unison. That changed once we found Lucy and Ardi. Ardi destroyed the Savannah hypothesis but you’d never know it by reading the bone collectors literature. Bipedalism came first and by a substantial time margin too. Bone collectors have focused on the pelvis evolution a lot in their literature over the past 150 years. I always thought that was a mistake because with Lucy skeleton, we knew we walked before we got a big brain. So letting go of the pelvis fixation issues would have made more sense to me. I decided to look at the spine and the feet first because they have done nothing to figure out why we are walking on two feet looking at the pelvis. I think the pelvic

changes are all to do with the later development of the brain. I know a little something about the brain and spine in my business. So I changed my view point to feet, because bipedal creatures walk on them. I realized that bone collectors have always stayed away from the the mystery of transitional feet because they do not have many to study. You would have thought that would make them go to examine the spine in a new light, but they did not. They were fascinated by the pelvis and this got them into trouble in their formation of theories in my view. This is how you make big errors in assumption. It all started with Raymond Dart, and the skull he found, and has gone down hill from there. So I asked a different question to myself. Why was the spine and then the pelvis transformed first and not the skull? My perspective as a spine surgeon made me look at 'their problem' with a new set of glasses from a new mountain range.

To this neurosurgeon, it sounded like the ideal place to grow larger hind limbs compared to arms then proceed to form a massive brain, based upon what we know today about how mammalian body plans forge neural and spinal growth. The hind limb of most mammals is more well developed in quadrapeds. But I felt the answer had to be an environmental one and one that caused and epigenetic change to our feet. There is a highly conserved embryologic plan the dictates these moves in all vertebrates and uses the same genes and is dictated by hormones. Most of this information has been found in the last ten years and is far superior than the bone data we have previously relied upon. We also now definitiely know the climate was radically different in the cradle of human origins in the Rift Zone than it is today or was before that time. It was colder and wetter and the climate changed quickly and this also helped facilitate our speciation from the Great Apes. Why the climate changed is based upon the geology of the region and the effects of precessation and orbital forcing that I mentioned in my Factor X webinar in May 2012 when we spoke about the K-T event that formed our remote eutherian

ancestors. In this blog, I am going to show you how the same factors affected our recent ancestors. Our ancestors were cut off from their jungles and most of their grass lands, so they did what any species does. They evolved to the new environment. We cover this mystery in Brain Gut 3.

What was the currency that facilitated this change in those animals? Strap yourself in.

JUNK DNA IS THAT ANSWER: What is junk DNA you ask?

I spoke about that in CPC #4. The answer is found in what is not in primate DNA and what is found in human DNA. In primates we find a substantial amount of 'jumping genes" in their 'junk DNA' on our Y chromosome. The reason African apes have this ability is because they assimilated an ancient pathogen called HERV K that allowed for their genomes to carry the extra junk on their chromosomes without any risk of disease. Barbara McClintock discovered this junk in 1951 and called them jumping genes in corn, but most of medicine and researchers ignored her work (surprise) until 30 years later when they gave her the Nobel Prize. What does it do? Junk DNA allows our genome to move the proverbial furniture around to allow for very rapid DNA expression to occur! In essence the more retrotransposons one has, the more you can shuffle your genomic deck to adapt to anything you might face in the environment. This is vital information that bone collectors never saw because they are too busy studying skeletons with no feet. We learned all this stuff since we cloned the human genome and the chimp and gorilla genome. This is precisely how epigenetics works on a molecular basis in the primate tree. In scientific parlance, this means using these transposable genes forms the basis of rapid primate and human epigenetic adaptation. This is precisely why humans were able to quickly evolve from apes when the environmental changes in the Rift Zone called for it. It also suggests we won't find more transitional apes, because we came to the party quick.

How did we/they do it?

RADICAL IDEA NUMBER ONE IN THE SERIES: I believe the first major mutation we assimilated to accomplish this task was to acquire a leaky gut from a pathogen bacteria from the coastal waters!

I believe we inherited the leaky gut from transitional apes via our gut, by a bacteria very similar to vibrio cholera. The time apes seemed to be isolated in the East African Rift Zone seems to fit the ecology of this area perfectly for a bacterial parasite like Vibrio to infect shellfish that would have filled the meadows and estuaries in this area. Moreover, the protein that forms modern human enterocyte tight junctions of the paracellular pathway, is derived from a protein that is found in these bacteria as well. I think this gene was modified by a retroposon (a jumping gene) called Haptoglobin 2 that was recently found by Dr. Alessio Fasano at the University of Maryland.

Once this bacteria's genetic code was ingested by the ape and assimilated into our gut and our gut associated lymphatic tissues (innate and cell mediated immune system for further adaptability) we likely gained the ability to produce horizontal gene transfers, but more importantly, it set the table for transposable genetic elements to create new genes to solve old problems that our environment presented to us in the Rift Zone. In essence, the mutation selected for a leaky gut using genetic alterations in the gut microflora to cause rapid adaptations in our own immune system in an isolated group of apes in the East African Rift Zone. **This means transitional apes and man have a leaky gut by design.** It is not pathological as most believe today. (Slaying some dogma)

If this idea is correct, this means that we should also see big changes between primate and human immunity genes as well. Yes, we do see that too! That comes later in the series.

What would make primates more prone to persistent latent infections that don’t cause them disease to begin with you ask? African primates genomes have been radically altered by one particular genetic parasitethat makes it far easier for it to become infected by many other pathogens like Vibrio. This is something particular to African primates, from which humans definitely evolved. This is why African primates can harbor persistent subclinical infections that may facilitate rapid genetic transfers that alter expression of their genome or the genetic material they have assimilated over their own evolution. This ability would have been a huge adaptation advantage for a tree dwelling herbivore, because prior to this they would not have had an immune system able to defend against the new pathogens they faced in a colder wetter Pilocene environment. Today we have evidence that the primate genome contains genetic material that has colonized its host genome to create a very stable genetic library within their DNA to provide the “creative force” that enabled them to allow for hominid evolution. The proof that this molecular footprint, is in fact buried in primate ancestors, is found in the molecular biology of “jumping genes” (retroposons) of the human genetic code. This genetic remnants are far better than the fossil record of recording our history in my opinion, because they tell us precisely what happened to the mammalian body plan during the primate transition over time. The fossil records help nail the time frames down but it is not the holy grail of human evolution. This unique mechanism also correlates with mammalian complexity in the primate tree. The more complex a mammal is the more jumping genes it has in its genetic stable to deal a hand of cards that best matches the environment the species finds itself in. Humans have more of the jumping genes than any mammal on this planet.

Gene transfers are how bacteria and all eukaryotes genetically recombine their chromosomes to adapt to a changing environment. In other words, this is how apes and hominids are able to respond so quickly to changes they have faced in their

evolutionary history. We know from modern genomic surveys of primate and human genomes there is great homology. The similarity is so great (98.5{a7b724a0454d92c70890dedf5ec22a026af4df067c7b55aa6009b4d34d5da3c6} in true coding regions) that it would be difficult to distinguish human from chimpanzee genes only via their true coding regions. Recently, it has been reported that those genes that do differ often correspond to those involved in smell or diet. These are both sensory traits that tie directly to epigenetics and to the brain and the gut.

Apes and humans are the only mammals with massive amounts of these 'jumping genes' in their genome. Within these jumping genes, there is an even bigger difference between humans and apes. It is the shear amount of this non coding DNA. Humans have 50-60{a7b724a0454d92c70890dedf5ec22a026af4df067c7b55aa6009b4d34d5da3c6} of their DNA that is non coding. Another shocking difference is that most of human non coding DNA origin is from a special type of virus! In fact, 8-10{a7b724a0454d92c70890dedf5ec22a026af4df067c7b55aa6009b4d34d5da3c6} of the human genome is composed of assimilated viral elements, and most is on the Y chromosome! The Y chromosome only has 20 genes on it. That makes it our most unique chromosome. Most of the genes controlling brain growth are molecularly tied to this region as well! Are you feeling the homology here people? We know this from modern molecular biology techniques developed in the last ten years. We assimilate these viral particles from our leaky gut by design to create new genes. This is how you go from a tree dwelling small brained quadraped herbivore to an upright smart ass in a million years.

You might find this fact more amazing. Only 3{a7b724a0454d92c70890dedf5ec22a026af4df067c7b55aa6009b4d34d5da3c6} of human DNA contains the instructions for building cells and tissues in humans.

97{a7b724a0454d92c70890dedf5ec22a026af4df067c7b55aa6009b4d34d5da3c6} of our DNA is is not active in building a thing normally. Ponder that fact for a minute. Then ask yourself why would evolution collect and carry that much DNA if it were really junk? The reason she does this is simple. This 'junk DNA' is how evolution works so rapidly to adapt to changes in the environment. Ever since the K-T event, if you match up DNA genomes from these animals there is a simultaneous corresponding increase amount of junk DNA in their genomes. Humans have the most of all the mammals since K-T event. This is just another fact that supports my idea that evolution decided to speed up DNA expression to all the animals who survived this event. Junk DNA is how it accomplished the task in the primate and homo trees of life to an even greater degree. The more junk DNA you have the better able you are to adapt to a changing environment. It also allows evolutionary speed to increase as time elaspses. At first, scientists called this DNA, 'junk DNA' when I was medical school. Since then it has been upgraded to non coding DNA, and now it is called retrotransposons. They now are realizing that this "junk" is really important to all mammalian evolution. In fact, it is the key to understanding how we came from Great Apes so fast.

Jumping genes are found in many life forms but they are loaded in the DNA of apes and humans. Humans, however, have a lot more than primates. Stop and ask yourself why, now? This, to me, was a lot more interesting that bone data. This DNA has the information that formed those bones so I left bones alone when I realized how the chain of evidence was falling.

THE EVOLUTIONARY CURRENCY FOR HOMINID SPECIATION WAS THE FORMATION OF THE LEAKY GUT, DOC?

Yes, you read that correctly. Today in the blogosphere everyone and their grandmother thinks the leaky gut is 'bad actor'. We must always understand the context of something when we speak about it. Yesterdays adaptation becomes todays

neolithic disease when the environment changes away from the original adaptation. I showed you in CPC #4 how what you believed about hemochromatosis and T1D might be mistaken too when you viewed it from an evolutionary prism. Well, here is the biggest twist on the evolution of hominid story. In my opinion, the formation of a "leaky gut" is precisely how the homo came from the apes. Why? Because some apes were walled off from their populations they began to rapidly evolve in the new environment that they found themselves in randomly in the East African rift zone. This area of Africa is by far the most geologically active part of that continent in the last 5-7 million years because it is a place where three tectonic plates meet and where water has come and gone several times over that span.

HOW DID THIS HAPPEN AGAIN?

We get junk DNA from bacteria, virus's and fungi that we assimilate from our leaky guts. How do most mammals get them other than humans? They get them from infections over the course of evolution, but not via their leaky guts. **A leaky gut is a purely human adaptation. The evolutionary adaptation of zonulin is the "hardware" of human evolution, in my opinion**. The "software" in the plan of this evolution is our co-evolving gut microbiota. Our gut flora was sculpted by the diet we found in the East African Rift Zone at the time we evolved. Our leaky gut became our '**fossilized genomic library for parts**' that fueled are rapid ascent to homo. This assimilation of RNA and DNA from bacteria found in our environment at that time is what our ancestors called upon when their environment dictate a change. The more dissimilar DNA we could assimilate the more adaptable we became and the faster it happened. Notice that I did not use any bone collectors data here…….at all. You do not need it yet, for this puzzle.

We incorporate bacterial, fungal and viral genetic material into our genomes but humans are especially adept at

assimilating viral RNA into their DNA using reverse transcriptase enzymes. I mention this enzyme here, not to confuse you, but many people have heard of this enzyme because this is the enzyme HIV uses to enter our T cell genomes today and cause disease. I mentioned in the Factor X webinar and the blog that followed it, that HIV may hold a great clue to the unfolding story of human evolution. Well, here you are seeing where a virus like HIV has shaped the primate tree of life to become us.

RADICAL RULE TWO: Retrotransposons are jumping genes and human retrotransposons are overwhelmingly from retroviruses! Most retrotransposons come into our system via our leaky guts and get assimilated via our gut associated immune system (GALT). HIV is the most famous retrovirus humans know about, but not the most important. When I was in medical school the rules of genetics said that genetic information flowed in a one way street moving from DNA to RNA and to protein formation. HIV is a retrovirus that uses RNA to incorporate its RNA into our DNA directly. It broke the rules of genetics back in the 1980's as we knew them to exist. Today, HIV causes a disease called AIDS. I believe that one day HIV eventually will improve our immune system tremendously because of what we know about how retrotransposons work in our genome today. It might even be the way where may be able to evolve evolutionary cures from the modern neolithic diseases we face today. Yes HIV, may one day cure some neolithic disease you have now.

Moreover, we now know today that the fastest route to an HIV infection is in the Peyer's patches of the gut and not from blood or fluids as we thought initially. When I learned this fact about ten years ago I realized that if a large virus like HIV could get through our gut lining so easily I thought there had to be an evolutionary reason for us to have a leaky gut to begin with for some reason. I also found out that we believed HIV came from a simian version of the virus. Humans acquired this simian virus by eating chimps infected with it as

bushmeat in Africa. It appears the virus then mutated in us by antigenic drift and caused human immunodeficiency virus and it came from Africa to the United States by a homosexual male airline stewardess in the early 1980's. Because the vector of transmission was a human gay male, epidemiologists and researchers thought this disease was predominantly a blood and fluid transmitted disease. This only appeared to be true because of the behavior of the person initially infected who brought this to North America. It spread rapidly here in the gay community initially, because they had no innate immunity to this virus, but within 5 years it began to spread to all human groups. The mode of transmission in Africa is very different than it was in the US. Today, HIV is controlled with protease inhibitors and it is rarely a death sentence. The viral RNA of HIV has become part of an estimated two billion humans DNA already since the pandemic began in 1981. The reason AIDS spread so fast is because humans have a system set up to take advantage of RNA viruses to guide their evolutionary development. How is that for irony?

Subsequently, we found that in primates they could not acquire HIV via their guts, as humans who became infected with SIV after eating infected bushmeat did become infected initially. This unique feature between two closely related primates made me ask why this was the case? It was at this point I found out **that humans have zonulin and primates do not.** Zonulin is the protein that makes human guts naturally more leaky than a primates gut! It also appears that African primates are colonized with SIV and this infection makes them much more susceptible to other support persistent infections that have driven hominid evolution.

In other words, these two virus stories strongly suggested to me that this difference is the major difference between our species because of a deep evolutionary reason. In my opinion, that reason was to increase the translocation of genetic material from our diets via our gut flora to incorporate into

our DNA to allow for a more rapid adaptation to any environment we might face.

The initial purpose for a "leaky gut" became a major advantage to the evolution of the homo species.

How is that for an unexpected twist?

One of my readers, Alex , got the huge implication of this coming monster series when he made a comment on the last blog that said this, " The evolutionary advantage of zonulin induced gut permeability conferred to a human would be an accelerated nutritional influx and a subsequent acceleration of tissue growth and repair! Primates and other animals without this inherent advantage would not have been able to adapt to the environment as quickly due to the limitation imposed by an impermeable gut." Alex got the implications, but just wait until I show you how this occurred. The genetic gymnastics of the transitional apes to early homo was nothing short of amazing and fully accounts for most unique human characteristics of bipedalism and encephalization.

Next up: Brain Gut 2 What were the naturally selected for environmental triggers of isolated primates that selected for having a leaky gut?

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