RAW EDGE PRODUCTIONS PRESENTS

veganpalooza

2012 VEGETARIAN WORLD SUMMIT

HOSTED BY DR. WILL TUTTLE AND STEVE PRUSSACK

VIP TRANSCRIPT SERIES

INTERVIEW WITH DR MILTON MILLS

Milton R. Mills, M.D. serves as associate director of preventive medicine for the Physicians Committee for Responsible Medicine (PCRM), a Washington, D.C.-based nonprofit organization dedicated to promoting preventive medicine, especially better nutrition, and higher standards in research.

A graduate of Stanford University School of Medicine, Dr. Mills practices outpatient clinic-based medicine in Northern Virginia and works as a critical care physician with Fairfax Hospital in Fairfax, Virginia. As an African-American physician focusing on preventive medicine, Dr. Mills has delved into some of the environmental and societal infl uences affecting the health of African Americans and other racial minorities.

The Anatomy of a Vegan

STEVE PRUSSACK: Everyone's on the line, and we're ready to welcome you all to Veganpalooza 2012 Vegetarian World Summit. I'm your co-host Steve Prussack, and we're ready to introduce our next guest. We'd like to welcome Dr. Milton Mills. He's a medical doctor in private practice, Associate Director of Preventative Medicine with Physicians Committee for Responsible Medicine, and the co-author of the Physicians Committee report on Racial and Ethnic Bias in the U.S. Dietary Guidelines. I'm honored to have him with us, and let's welcome to the call our friend and co-host Dr. Will Tuttle.

DR. WILL TUTTLE: Thank you, Steve. Yes, we're really delighted to have with us here on Veganpalooza 2012 Dr. Milton Mills, M.D. As Steve said, he's been an M.D. in private practice for a long time and also long-time vegan. I've heard his presentations a number of times, and they're very, very informative and interesting. So I'm really glad that we are able to have some of this insight and wisdom with us here on Veganpalooza. So Dr. Mills, I'd like to just begin by asking if you could talk to us a little bit about the comparative anatomy of human beings as compared to, say, omnivores, carnivores, herbivores, because a lot of people say, "No, we've got these big teeth, these big canines, so they're designed to tear flesh, so we must be flesh-eaters." Some of these ideas are still actually quite pervasive in our society. So I was wondering, from your perspective, if you could talk about what are we designed to eat from an anatomic point of view?

DR. MILTON MILLS: Sure. Let me just start by saying that animals that are designed to eat plants, the tissues of plants and animals that are designed that eat

the flesh of other animals are dealing with very, very different types of food. Animal tissue, animal cells, have a cell membrane. They are filled with proteins, fats, and maybe a minimal amount of carbohydrate, but there's no fiber in animal tissues. There's no cellulose. There are no indigestible parts. So animals that are designed to eat meat tend to have very simple and rather short digestive tracts. The problem that carnivores, which are the animals that are designed to eat animal tissue, confront is that I guess you could say the problems associated with their food are problems that occur upfront, meaning that they typically are trying to eat animals that don't want to be eaten, so they have to be anatomically designed not only to chase down prey but then to actually attack it, kill it, and then dismember it. As a result, these animals are all designed to run fairly fast. They can all run on average 30-35 miles an hour, with the exception being the cheetah, which as we know, for a very short burst of speed, can reach up to 60-65 miles an hour for maybe around 300 yards or so. They have very strong jaws that allow them to not only grab their prey but hold onto it while it's struggling and to also suffocate it and then dismember it with their, again, with their jaws, so their jaws are very strongly constructed. They develop tremendous bite forces that allow them to break bones, chew through tough hides. Their teeth are designed to, one, to again, grapple with prey. They have very long dagger-like canines that can rip and flesh and tear apart. Their molars are constructed like little serrated steak knives, in essence. They're blade-shaped, they're serrated, and when their jaw closes, the upper molars slide past the lower molars in a vertical plane so that you get a nice slicing motion. This allows them to slice flesh off bone, and then they swallow it because they don't chew. Carnivores don't chew their

food. They swallow it either whole or in very large chunks.

It goes into their stomach, which has extremely powerful acids that allow them to dissolve bones, hooves, connective tissue, hides, and this sort of thing. When carnivores have food in their stomach, they secrete so much acid that the pH of their stomach is less than 1. The pH scale typically runs from 1 to 14 with 7 being neutral and anything over 7 being progressively more basic. A pH of less than 1 means that you've got this acid that's stronger than the acid in a car battery. Once the meal has been basically liquefied by their stomach, it passes into their small intestine, which tends to be very short. The small intestine of a typical carnivore is only about maybe three to four times its body length, and that's because the protein, fat, and carbohydrate are very quickly and efficiently absorbed, and it doesn't take a long small intestine to accomplish this. Then whatever residue is left over passes into their colon, which again tends to be very short, straight, and smooth. Essentially once it gets there, the animal defecates to get rid of this leftover material because all that can happen to it is that it can start to putrefy if it's kept within their bodies.

Now you contrast that with herbivores, and herbivores are eating food that doesn't cause you problems upfront because plants are anchored into the ground and they don't bite you. But the problem, I would say the difficulty, not the problem, comes with the actual digestion of plant material because unlike animal tissues, plant tissues have cellulose, which is an indigestible plant fiber that no mammal makes enzymes that can break cellulose apart. So because of all this fiber in plant food, it takes a lot more processing and a much longer time to actually extract and absorb the nutrients from

this food. So one of the first things you notice about herbivores is that they must chew their food. The purpose of chewing is to mix the plant material with digestive enzymes so that these enzymes can start the process of breaking down the carbohydrates and other, essentially the carbohydrates in the plant food. It then passes, I should say, to accomplish this, they have a jaw structure which is very different than that of carnivores. Carnivores have jaws that are basically shaped like a pair of shears. The jaw joint is on the same plane as the cheek teeth so that when the jaw closes, it closes just like a pair of shears close, whereas with herbivores, the lower jaw has become L-shaped. The jaw joint has moved to a position above the plane of the teeth, and that means that when the jaw closes, instead of closing with a slicing motion, the teeth actually come together all at once, and instead of sliding past each other in the vertical plane, they slide across one another in a horizontal plane, which is what gives you that grinding motion of chewing.

Plant-eating animals frequently have enzymes in their saliva that will start the process of digesting plant foods. The ruminants, which are the herbivores that are designed to eat very rough or very coarse plant material, like grass and hay, actually will first consume a stomach full of grass or hay. It goes into their first stomach. These are the animals that have four stomachs. In that first stomach is a population of bacteria and protozoa that make enzymes that can actually break cellulose apart because remember I said no mammal actually makes an enzyme that can break apart cellulose, but bacteria and other microorganisms do. That's why these animals need these four stomachs. In the first stomach is this bacterial soup that releases all of these cellulose-digesting enzymes. They swallow a stomach full of food, let it soak up those enzymes, and then

they bring it back up and start to chew it, and that's what chewing the cud is all about. It's to mix that plant material thoroughly with those digestive enzymes so it can really, efficiently break apart the cellulose. They then swallow it again, but it goes into the second stomach, where it begins to essentially ferment, that is, the enzymes start to do their job and break apart the cellulose. It eventually passes into their small intestine, which the small intestine of herbivores is much, much longer than that of carnivores. Typical length of a small intestine in a plant-eating animal is about 10 to 12 times the body length. That's, again, because of all this fibrous material, it takes a lot longer to extract the nutrients from this plant food. So they need a much longer small intestine. Then the leftover residue passes into their colons, which, again, tend to be very long because they can also do additional bacterial fermentation of whatever fiber is leftover to extract additional energy from it.

When you look at human beings, we have those classic features associated with a plant-based diet. We have our teeth, our incisors are broad and basically shaped like spades. They're designed for cropping plant material and peeling fruit and that sort of thing. They aren't these sharp, pointed, short, peg-like incisors you find in carnivores. While we do have canines, lots of herbivores have canines. The fact that canines are present doesn't necessarily tell you, in the absence of looking at all the other teeth and the mechanics of the jaw, doesn't tell you what that animal's designed to eat. Furthermore, the canines in human beings have become reduced to the size of incisors, and instead of being rounded and conical shaped, more like a dagger, they've become flattened and function like accessory incisors. They don't, they're useless, utterly useless for ripping and tearing meat. Our jaw structure is,

again, like that of the classic herbivore with a jaw joint above the plane of the teeth. We have flat, nodular molars like other herbivores, and our jaws slide across one another in a horizontal plane, not past each other in a vertical plane like the carnivores.

When we, the reason that we must chew our food is because we have enzymes in our saliva called, an enzyme called salivary amylase that actually starts the process of breaking down plant material while you're chewing it. Food then passes into our stomach, where it's turned into a liquid. Then it moves into the small intestine, which the average length of the small intestine in human beings is 25-30 feet or more, and when you measure actual human body size, which is not head to toe but actually head to tail bone, the average human body length 2.5-3 feet. So again, we have the classic proportions of your typical herbivore. Once we've extracted the readily available nutrients from a meal, the leftover fiber then passes into our large intestine, which has the, again, the typical sacculated appearance of the colons of other herbivores like horses and several other primates, where we have a population of bacteria that actually act on that fiber and break it down into compounds called short-chain fatty acids that we can use for energy and also that help regulate our physiology in a number of important ways. These short-chain fatty acids decrease blood sugar levels, which is important for controlling diabetes. They decrease cholesterol levels. They help protect us against colon cancer, and they do a host of other beneficial things for us if we're eating the right foods and delivering the right materials to our colonic bacteria to do the job that they're supposed to do. So clearly human beings have the anatomy and physiology of your classic herbivore and not at all like that of the carnivore.

Now what about this issue of omnivores? Well, people say, "Human beings are omnivores." Yes, we are behavioral omnivores, and what I mean by behavioral omnivores is that many of us do choose to include both animal food and plant food in our diet, but that doesn't necessarily tell us whether or not we're actually designed to do that. When you look at those animals that are actual anatomic omnivores, you find that they have some of the features of carnivores with a few herbivorous adaptations that allow them to eat a limited range of plant foods. Those are typically bears and raccoons and so forth. They have somewhat flattened molars, partially flattened molars that allow them to grind up very soft pulpy plant foods, like fruits and roots and tubers, but they also are still constructed primarily like carnivores so that they can still hunt and kill prey, dismember it, and consume it without causing themselves harm. We could actually spend several hours talking about this topic.

DR. TUTTLE: Yeah, you've given us a good, I think that's really interesting. Also I think you mentioned that our stomach acid is not nearly as strong.

DR. MILLS: No, the pH of our stomach is only about 4. Which, again, it's acidic, but it's not nearly as strong by several orders of magnitude as that of a typical carnivore.

DR. TUTTLE: Right. Then if could you talk also, I mean, obviously when we eat animal foods and we're not designed to, it's going to cause a whole range of problems that we see and diseases that we have. But you've also done quite a bit of research and presentations on the psychology of this. I think sometimes it's called the disgust mechanism. Could you talk a little bit

about that? Because I think that's also interesting for our listeners.

DR. MILLS: Well, the emotion of disgust is believed by psychologists to be one of six basic human emotions. The others are happiness, sadness, fear, anger, and surprise. Disgust is frequently broken down into three domains. There's what's called pathogen disgust, which concerns itself with things that we eat and protecting the body from potentially injurious agents that could harm our health or end our life. Then there's the domain of sexual disgust, which concerns itself with inappropriate sexual pairing such as incest or pedophilia and this sort of thing. Then there's what's called moral disgust, which has to do with our distaste for people who are amoral and vile and people who lie and cheat and steal and that sort of thing. Clearly with respect to food we're dealing with pathogen disgust. What's interesting is that when you look at the literature of the kinds of qualities that elicit pathogen disgust from human beings around the world, there are obviously, in different societies different things will provoke disgust, but when you look at human societies around the world, there are certain qualities that make the list in every society. So from that we can infer that these are basic to all humans, and those qualities have to do with things that are moist and wet and slimy, things that are bloody, things that are rotting or covered with flies and maggots, things that have fur or hair on them, things that tend to be asymmetric or amorphous in their shape.

When you actually think about those things in sum total, what I came to the conclusion of was that this was describing raw meat because raw meat in its unprocessed and unchanged form has all of those qualities. It's moist. It's wet. It's slimy. It's bloody. It tends to

be very, if you haven't actually cut it up and butchered it, it's very amorphous and asymmetric in its shape. If it's left out, it will clearly rot and become infested with flies and maggots. So what's clear to me is that this disgust we have for raw animal flesh is a mechanism meant to protect us from ingesting something that our bodies weren't designed to ingest. This is why in order for humans to find meat and animal tissue palatable, we have to change it in such extreme ways. We first butcher it, which is really changing the shape and look of meat. We peel off the skin, we pluck out the feathers, we take off the hair and the fur, we then drain the blood out of it, we then cut it into these little small rounded shapes, and then we actually cook it to make it be less mushy and moist and more firm like the tissues of plants. Then one of the most telling aspects is that all of the herbs and spices that we use to flavor meat and fish are all plant products. So in essence what we're trying to do is make this animal tissue taste like the plant foods that our brains really crave and desire.

DR. TUTTLE: Wow. Also when we look at the kinds of foods that are attractive to us, what are those?

DR. MILLS: Those are things that are brightly colored, things that are round or smooth in their texture, things that have a firm feel to them. Breakfast cereal is all built on the fact that studies have shown time and time again people like a crunchy, firm mouth-feel to the food that they're eating. So again, when you look at the smells that we like, the textures that we like, and the colors that we like, these are all things that are qualities that are associated with plant tissues. Again, it's very telling that when it comes to how we, the things we want to smell and how we ourselves want to smell, in terms of the perfumes and co-

lognes that we use, again, we're using all of these floral scents and plant products to create these compounds or perfumes or colognes or deodorants or home deodorizers to essentially mimic a plant-based environment.

DR. TUTTLE: Right. And very often a burger, of course, is covered with tomatoes and lettuce and onions and ketchup and mayonnaise and all these things.

DR. MILLS: Absolutely. Right. Because that makes it taste better.

DR TUTTLE: Right. Then also I was wondering if you could say a few words about something that is kind of related to this, I think, which is we hear quite a bit of talk and theorizing that we human beings are meat-eaters, that that was sort of gave us the fuel thousands or millions of years ago to enlarge our brains, and if we gave up eating meat, we'd be giving up something that is essentially what makes us human and what gives us the intelligence. Do you put any stock into these kinds of theories that are sort of bandied about now in some circles?

DR. MILLS: Absolutely not, because as I've often said, if meat-eating leads to big brains and intelligence, then lions should have brains the size of the Empire State Building. The fact is that brain size has nothing to do with meat-eating. Those theories that have been proposed that meat-eating somehow led to human brain development are just ridiculous and ludicrous. They're proposed by people who have absolutely no understanding of human health or physiology, no medical background, no medical training, and the fact is that the brain is comprised primarily of fatty tissue. So protein is not helpful in building a huge brain. The two largest

brains on terrestrial animals belong to humans and to elephants, and we are both strict herbivores. It does not take meat to create a big brain. That is just a fallacy of reasoning, and these authors that have proposed these theories have no rational or physiologic support for it. They just kind of threw that out there to try and come up with a reason for eating meat. But again, it's a ridiculous notion because carnivores eat nothing but meat, and none of them have big brains. The absolute biggest brain on the planet belongs to the elephant, and they don't eat any meat.

DR. TUTTLE: Right. Great. I think, like you say, it's sure to be a popular theory and sell lots of books because it helps people, it's like saying to a bunch of heroin addicts that heroin gives you a big brain.

DR. MILLS: Right, exactly. But then you look at what happens to people when they eat meat, they develop chronic disease. They are more predisposed to infection. It creates all sorts of health problems. So that is one of the main reasons these theories make absolutely no sense because physiologically we clearly are not adapted for a diet that is based around animal foods because it will create disease, and it will shorten your life.

DR. TUTTLE: Right. Great, well, thank you so much, Dr. Milton Mills, for joining us here on Veganpalooza 2012. It's really been so interesting to go in depth into the comparative anatomy of carnivores, herbivores, and omnivores, and also into these other topics. I was wondering before we terminate here, are there any other things you'd just like to say to people who are listening in that you think would be, in a few minutes, just kind of any last thoughts for people to help them understand all this a little bit better?

DR. MILLS: Just that the things that our bodies need are antioxidants, phytochemicals, vitamins, nutrients, all of the things that are found in plant foods that research has shown help suppress disease, help fight infection, and actually help us live longer. All the studies on longevity show that those populations around the earth that are longest lived are those that eat a primarily or entirely plant-based diet. As you progressively eat more, include more and more animal foods in your diet, you find that life span starts to shorten and the list of chronic diseases starts to go up. So the thing that I always tell my patients is look. People often say, "I can't live without this" or "I need this". The fact is none of us ask for fried chicken, ice cream, or cheeseburger in the delivery room. Everything that people think that they like, they had to learn to like. Just like you learn to like unhealthy things, we can learn to like foods that are healthy for us, and they actually preserve our health and lengthen our life as opposed to destroy our health and shorten our lives.

DR. TUTTLE: Thank you so much. Well said. I really appreciate again your joining us. Steve, do you have any last-minute thoughts you'd like to share or anything else?

STEVE: Just some great food for thought right there, Dr. Tuttle. Dr. Mills, thank you so much. Thank you all for listening to this session of Veganpalooza 2012 Vegetarian World Summit. Again, special thanks to our guest Dr. Milton Mills. If you'd like a written word-for-word transcript of this session and all the others, as well as the digital audio downloads of everything in the event, just visit Veganpalooza V.I.P. at veganpalooza.com/vip or you can follow the link on the

event scheduling page. We look forward to connecting with you in the next session, so stay tuned.