

## Chapter 10

### The Paleolithic Athlete:

### The Original Cross Trainer

#### A day in the life of a hunter-gatherer

Ten thousand years sounds like a long, long time ago. But if you think about it in terms of how long the human genus (*Homo*) has existed (2.5 million years), 10,000 years is a mere blink of the eye on an evolutionary time scale. Somewhere in the Middle East about 10,000 years ago a tiny band of people threw in the towel and abandoned their hunter-gatherer lifestyle. These early renegades became the very first farmers. They had forsaken a mode of life that had sustained each and every individual within the human genus for the previous 100,000 generations. In contrast, only a paltry 500 human generations have come and gone since the first seeds of agriculture were sown. What started off as a renegade way of making a living became a revolution that would guarantee the complete and absolute eradication of every remaining hunter-gatherer on the planet. At the dawn of the 21<sup>st</sup> century we are now at the bitter end. Except for perhaps a half dozen un-contacted tribes in South America and a few others on the Andaman Islands in the Bay of Bengal, pure hunter-gatherers have vanished from the face of the earth.

So what difference does it make? Why should 21<sup>st</sup> century endurance athletes care one iota about whether or not there are any hunter-gatherers left on earth? Because once these people are gone we will no longer be able to see how they typically exercised or what they ate. Their lifestyle holds invaluable clues to the exercise and dietary patterns that are built into our genes. When I was a track athlete in the late 1960's and early 1970's, runners rarely or never lifted

weights, and back then no runner worth their Adidas or Puma flats would even think about swimming. Fast forward 30 years. What progressive coach now doesn't know the value and benefit of cross training? The idea that cross training has value probably could have been figured out much earlier had we only taken notice of clues from our hunter-gatherer ancestors.

Very few modern people have ever experienced what it is like to "run with the hunt". One of the notable exceptions is Dr. Kim Hill, an anthropologist at the University of New Mexico who has spent the last 30 years living with and studying the Ache hunter gatherers of Paraguay and the Hiwi foragers of Southwestern Venezuela. His description of these amazing hunts represents a rare glimpse into the activity patterns that would have been required of us all, were it not for the Agricultural Revolution.

*"I have only spent a long time hunting with two groups, the Ache and the Hiwi. They were very different. The Ache hunted every day of the year if it didn't rain. Recent GPS data I collected with them suggests that about 10 km per day is probably closer to their average distance covered during search. They might cover another 1-2 km per day in very rapid pursuit. Sometimes pursuits can be extremely strenuous and last more than an hour. Ache hunters often take an easy day after any particularly difficult day, and rainfall forces them to take a day or two a week with only an hour or two of exercise. Basically they do moderate days most of the time, and sometimes really hard days usually followed by a very easy day. The difficulty of the terrain is really what killed me (ducking under low branches and vines about once every 20 seconds all day long, and climbing over fallen trees, moving through tangled thorns etc. I was often drenched in sweat within an hour of leaving camp, and usually didn't return for 7-9*

*hours with not more than 30 minutes rest during the day. The Ache seemed to have an easier time because they "walk better" in the forest than me (meaning the vines and branches don't bother them as much). The really hard days when they literally ran me into the ground were long distance pursuits of peccary herds when the Ache hunters move at a fast trot through thick forest for about 2 hours before they catch up with the herd. None of our other grad students could ever keep up with these hunts, and I only kept up because I was in very good shape back in the 1980s when I did this."*

*"The Hiwi on the other hand only hunted about 2-3 days a week and often told me they wouldn't go out on a particular day because they were "tired". They would stay home and work on tools etc. Their travel was not as strenuous as among the Ache (they often canoed to the hunt site), and their pursuits were usually shorter. But the Hiwi sometimes did amazing long distance walks that would have really hurt the Ache. They would walk to visit another village maybe 80-100 km away and then stay for only an hour or two before returning. This often included walking all night long as well as during the day. When I hunted with Machiguenga, Yora, Yanomamo Indians in the 1980s, my focal man days were much much easier than with the Ache. And virtually all these groups take an easy day after a particularly difficult one."*

*"By the way, the Ache do converse and even sing during some of their search, but long distance peccary pursuits are too difficult for any talking. Basically men talk to each other until the speed gets up around 3km/hour which is a very tough pace in thick jungle. Normal search is more like about 1.5 km/ hour, a pretty leisurely pace. Monkey hunts can also be very strenuous because they consist of bursts of sprints every 20-30*

*seconds (as they monkeys are flushed and flee to new cover), over a period of an hour or two without a rest. This feels a lot like doing a very long session of wind sprints.”*

*“Both my graduate student Rob Walker and Richard Bribiescas of Harvard were very impressed by Ache performance on the step test. Many of the guys in their mid 30s to mid 50s showed great aerobic conditioning compared to Americans of that age. (VO2 max/kg body weight is very good). While hunter gatherers are generally in good physical condition if they haven't yet been exposed to modern diseases and diets that come soon after permanent outside contact, I would not want to exaggerate their abilities. They are what you would expect if you took a genetic cross section of humans and put them in lifetime physical training at moderate to hard levels. Most hunting is search time not pursuit, thus a good deal of aerobic long distance travel is often involved (over rough terrain and carrying loads if the hunt is successful). I used to train for marathons as a grad student and could run at a 6:00 per mile pace for 10 miles, but the Ache would run me into the ground following peccary tracks through dense bush for a couple of hours. I did the 100 yd in 10.2 in high school (I was a fast pass catcher on my football team), and some Ache men can sprint as fast as me.”*

*“But hunter-gatherers do not generally compare to world class athletes, who are probably genetically very gifted and then undergo even more rigorous and specialized training than any forager. So the bottom lines is foragers are often in good shape and they look it. They sprint, jog, climb, carry, jump, etc all day long but are not specialists and do not compare to Olympic athletes in modern societies.”*

Dr. Hill’s wonderful imagery and insight tells us part of the story, but not everything. In this day and age of gender equality women are just as likely as men, if not more so, to be found at the gym lifting weights or out on the trails running or riding their bikes. In stark contrast, hunter-gatherer women almost never participated in hunting large game animals. Nearly without exception, ethnographic accounts of hunter gatherers are in agreement on this point. Does this mean that women did no hard aerobic work? Absolutely not! Women routinely gathered food every two or three days. The fruits of their labors just didn’t include plant foods, but also small animals such as tortoises, small reptiles, shellfish, insects, bird eggs and small mammals. They spent many hours walking to sources of food, water and wood. Sometimes they would help carrying butchered game back to camp. Their foraging often involved strenuous digging, climbing and then hauling heavy loads back to camp while frequently carrying infants and young children. Other common activities, some physically taxing, included tool making, shelter construction, childcare, butchering, food preparation, and visiting. Dances were a major recreation for hunter-gatherers and could take place several nights a week and often last for hours. Table 10.1 shows some typical hunter gatherer activities and their modern counterparts along with the associated caloric costs.

Table 10.1. Caloric cost of various hunter gather and modern activities

Hunter-gatherer	Modern equivalent	Caloric cost	
Activity	Activity	(kilocalories/hour)	
		(176 lb Male)	(132 lb. Female)
Carrying logs	Carrying logs	893	670

Running (cross-country)	Running (cross-country)	782	587
Carrying meat (20 kg) back to camp	Climbing hills (20 kg load)	706	529
Carrying young child	Climbing hills (10 kg load)	672	504
Hunting, stalking animals (carrying bows & spears)	Climbing hills (5 kg load)	619	464
Digging (tubers in a field)	Digging (in the garden)	605	454
Dancing (ceremonial)	Dancing (aerobic)	494	371
Stacking firewood	Stacking firewood	422	317
Butchering large animal	Ax chopping, slow	408	306
Walking - normal pace (fields & hills)	Walking - normal pace (fields & hills)	394	295
Gathering plant foods	Weeding garden	346	259
Archery	Archery	312	234
Scrapping a hide	Scrapping paint	302	227
Shelter construction	Carpentry, general	250	187
Flint knapping	Shoe repair, general	216	162

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So, the overall activity pattern of women, like men, was cyclic with days of intense physical exertion (both aerobic and resistive) alternated with days of rest and light activity. What hunter-gatherers had to do in their day-to-day activities is turning out to be good medicine for modern day athletes. When Bill Bowerman, the famous track coach, at the University of

Oregon advocated the easy/hard concept back in the 60's it was thought to be both brilliant and revolutionary. Using his system of easy/hard, athletes recovered more easily from hard workouts, and their chances of getting injured were reduced. Ironically, coach Bowerman's "revolutionary" training strategy was as old as humanity itself. Similarly, weight training combined with swimming was a stunning innovation at Doc Counsilman's world famous swim program at Indiana University in the 1960's. Now, it is a rare world class endurance coach who doesn't advocate cross training to improve performance, increase strength and reduce injury incidence. Once, again the rationale behind the success of cross training can be found in the hunter gatherer genes in all of us.

### **Why we are designed to exercise**

It may seem totally obvious, but sometimes the obvious is rarely considered. Do you know why the Ache and for that matter, all hunter-gatherers exercise? Before we go down this road, let's clarify the word "exercise". No adult hunter-gatherer in their right mind would have ever set off on a run, or repeatedly lifted a heavy stone simply to expend energy and "get exercise". Virtually all movement by adult hunter-gatherers resulted from the day's mandatory activities such as food and water procurement, shelter building, journeys, tool making, wood gathering, escape from dangers, child rearing, and social activities. The activities of daily life were all the "exercise" that Stone Age people would have ever taken. Hunter gatherers had no choice but to do physical labor of all kinds, every day – day in and day out for their entire life. Every single day, there were big tasks and small tasks alike that had to be accomplished to provide for basic human needs. There were no retirements, no vacations, no job layoffs, no career changes or labor saving devices. Except for the very young or the very old, everyone did labor of one form or another on a regular basis.

O.K. let's get back to the obvious that you may have never considered. Hunter gatherers "exercised" because they had to. They had no other choice – period ! For all humans living before the Agricultural Revolution, energy input (food) and energy expenditure (exercise) were directly linked. If Stone Age people wanted to eat, they had to hunt, gather, forage or fish. Now you can see what may have motivated the Ache hunters as they furiously chased that herd of peccaries hour after hour through the tropical forest in Paraguay. Whether you do a long, hard workout or no workout at all, food is always there for you at the end of the day. Wouldn't it be disappointing to do your long hard workout and come home to an empty fridge? Would an empty belly motivate you even more on the next workout (hunt), if the intensity of the workout was directly related to the amount of food in the refrigerator?

In the modern world we have totally and completely obliterated the ancient evolutionary link between energy expenditure (exercise) and food intake. As you lazily stroll down the supermarket aisle and throw one item after another into the cart, you don't give a single thought to "search time" or "pursuit" of your prey, as Dr. Hill graphically portrayed for us with his descriptions of the Ache hunters. In a modern supermarket, the "search" and "pursuit" time are identical whether you toss a smoked ham into your cart or a head of lettuce.

The consequence of severing this primeval evolutionary connection between energy expenditure and energy intake are not pretty. When we eat more energy than we expend, we gain weight. And when we gain weight, our health suffers. Unless, you haven't read a newspaper or a magazine lately, most of you know that we are in the midst of an obesity epidemic in the U.S. Two thirds of all Americans are either overweight or obese. Forty million American have type 2 diabetes and cardiovascular disease is the leading cause of death in this country. There is little doubt in my mind, that none of this would be possible without the

uncoupling of energy intake and expenditure that was handed to us when we deserted our ancestral hunter gatherer way of life.

### **Comparison of the lifestyles of hunter-gatherers and modern athletes**

After reading Dr. Hill's description of the Ache hunters you've probably got a pretty good feel for how their daily workout compares to yours. Some of you may be recreational athletes; some of you may be good local and regional endurance athletes, and a very few of you may be elite athletes of national or international caliber. How would the average hunter gatherers stack up when it comes to high level endurance performance on race day?

First, let's take a look at the advantages on the side of the hunter gatherer. From the time of weaning until very old age hunter gatherer athletes would have done moderate to hard aerobic activity month in and month out for their entire life. They would have regularly rotated hard days with easy days, and strength activities would always have commonly accompanied their aerobic work. This pattern of movement would have diminished their chance of injury so that they could get up morning after morning to hunt and gather again and again.

In exercise physiology there is a commonly known law stating that aerobic capacity (VO<sub>2</sub> max) within an individual may increase based upon exercise frequency, intensity and duration. Of these three factors, intensity is the most important feature in squeezing out the last little bit of aerobic capacity from already trained subjects. The problem is that as intensity increase, the chance of injury and illness also increase. Hunter gatherers were in it for the long haul. Their objectives were to obtain food day in and day out, year in and year out for their entire lives. High intensity exercise on a regular basis for them would have been a liability, since injury and illness meant less food. On the other hand, modern day endurance athletes don't have

to worry about injuries or illness getting in the way of eating. Food is available no matter whether you are injured or not. Accordingly, endurance athletes can take their chances with high intensity training. As a matter of fact, high intensity workouts (>85 % VO<sub>2</sub> max) are not an anomaly, but rather a requisite to perform at the highest levels upon the world's stage.

As we have previously outlined, it is virtually impossible to exercise at > 85 % VO<sub>2</sub> max for extended periods unless muscle glycogen stores are fully topped up. Without daily consumption of high glycemic load carbs, regular high intensity workouts simply are not feasible. Since high glycemic load carbs were not on the hunter gatherer menu, they could not have eked out the last 2-5 % of their genetic aerobic potential by doing high intensity workouts, as can modern athletes. On the other hand, because they ate more fat and fewer daily meals than we do, their intramuscular triglyceride stores would have been much higher, thereby allowing them to do aerobic work at moderate intensity for extended periods. Just what the doctor ordered if you need to go hunting daily and high glycemic carbs don't exist. For the modern-day endurance athlete who is solely interested in maximal performance, an alternative exists. Both can be done. You can maximize muscle glycogen and triglyceride stores by following the diet we have summarized in Chapters 2-4, 9.

Because the protein content of their diet was higher than ours, the concentration of the anabolic branch chain amino acids (leucine, isoleucine and valine) would have been much higher. As we have previously pointed out, these dietary amino acids promote muscle resynthesis following exercise and may also delay the onset of fatigue. Unless, you are eating lots of lean meats and fish, hunter gatherers would have had the advantage here. The high protein content of our ancestral diet meant that another amino acid, glutamine, would have also been higher than what you are getting if you are following a vegetarian beans and brown rice diet

or simply the standard American junk food diet. A classic symptom of overtraining in endurance athletes is low blood levels of glutamine.

The trick with glutamine is not just how much you are getting, but how much you are losing. Losing excess glutamine is just like not getting enough. If you are eating a high carb, low fat diet, which is pretty much the standard endurance athlete fare, it is almost certain that your body will be in a slight state of net metabolic acidosis. As we have previously shown you, a net acid producing diet causes your body to excrete more and more of the muscle's glutamine in an attempt to restore acid/base balance. The loss of muscle glutamine from an acid yielding diet and from insufficient intake of glutamine rich foods (lean meats, fish and seafood) may adversely affect performance. Chalk another advantage to hunter-gatherers.

One of the most important variables leading to athletic success is staying healthy and free of illness and colds. There is little doubt that proper nutrition is absolutely essential when it comes to optimizing your immune system. Because hunter-gatherers ate no processed foods, no cereal grains, no refined sugars or oils, their trace nutrient (vitamins, minerals and phytochemicals) intake was way higher than what the average U.S. citizen gets. Also, they consumed more healthful omega 3 fats than what most of us now get. These dietary advantages would have again allowed our hunter gatherer ancestors to go out day after day and hunt and forage for food without interruption from illness and colds. For our species, natural selection had no interest in winning a 10 k or marathon, but rather was more concerned with getting our daily calories. The name of the evolutionary game was adequate calories, not necessarily maximal exercise performance.

So, let's get down to the nitty gritty. Was there ever a hunter-gatherer who could have taken home the Olympic gold in any endurance event in the last 30 years? The answer is no.

The average hunter-gatherer was clearly more fit than the average American couch potato as we pointed out in the Prologue. Most foragers (men or women) would have also been able to run any recreational runner into the ground. At the local and regional levels, their best athletes would have been competitive. But when we compare them to elite national and international athletes, there is no comparison for two basic reasons.

First, are the numbers. The primary determinant of aerobic capacity is maximal oxygen consumption or VO<sub>2</sub> max. If you want to be a world-class endurance athlete, you better choose your parents well because VO<sub>2</sub> max is almost entirely determined by genetics. One of the highest VO<sub>2</sub> max values ever reliably recorded for an elite male athlete in the U.S. is about 84 ml/kg/min. Contrast this value to about 40 ml/kg/min for the average American male. So what happens if the 40 ml/kg/min guy wants to become world class and sets off upon an incredibly intense training program for years and years? Does he have a chance of getting to 84 ml/kg/min? Not even close! VO<sub>2</sub> max can increase by about 10-15 % in the best of all worlds, but no more. In the U.S. we now have more than 260 million residents. Compare this to the fewer than 1000 Ache hunter-gatherers that Dr. Hill hunted with. If only one person out of 1,000 has a genetically determined VO<sub>2</sub> max of greater than 70 ml/kg/min, then in the U.S. population there will be 26,000 people who have the genetic potential to perform at extremely high aerobic capacities. In the Ache hunter-gatherers only one person in their entire population will have this genetic capacity.

Hunter-gatherers wouldn't stand a chance against Olympian endurance athletes not only because of the numbers game, but because they were limited to low octane fuel. Intramuscular triglyceride is a great energy source for moderate to hard exercise lasting for hours and hours, but it can't hold a candle to glycogen when it comes to high level exertion at 85 % or greater of

the VO<sub>2</sub> required to make Olympic champions. Because hunter-gatherers ate less carbs and more fats, along with fewer daily meals, their intramuscular triglyceride stores would have been higher than ours. But also, they ate no high glycemic load carbs, so their muscle glycogen reserves would have always been lower than ours. They simply lacked the fuel injection of high glycemic load carbs to restore muscle glycogen concentrations following hard exercise. You now have this option. You can not only increase muscle glycogen concentrations via careful dietary manipulation, but by following our nutritional plan, you can also increase intramuscular triglycerides.

You, as a 21st century endurance athlete are no longer reliant upon the current scientific status quo relating diet to performance, but have the added advantage of knowing how the wisdom of your ancestral dietary background can improve performance. By combining the best of their world with the best of our's your performance will soar.