Re: Duplicate genes help humans dive deep distances

Source: http://sci.tech−archive.net/Archive/sci.anthropology.paleo/2007−08/msg00003.html

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A good illustration of the usual savanna biases: genes that "transport water & sugar into cells" are interpreted as proving enducrance running... Can you believe?? Equally stupid would be: genes that transport sugar+water prove diving.

Serious genetic evidence OTOH:

1) Humans have lots of olfactory genes inactivated as compared to chimps: this is difficult to understand in a savanna milieu, but is simply expected in diving lifestyle.

2) Humans have inactivated masticatory musculature (MYH 16) as compared to chimps: equally impossible to understand in a savanna milieu, but to be expected when soft food was important.

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Op 31−07−2007 03:58, in artikel 46AE972D.2BC00B32@xxxxxxxxxxxxxxx, Rich Travsky <traRvEsky@xxxxxxxxxxxxxxx> schreef:

> Genetic evidence showing running is in our genetic heritage. This article references
> a 2004 New Scientist article about human running ability which I excerpt at the
> bottom.
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> http://www.newscientist.com/article/dn12381−duplicate−genes−help−humans−go−the−extra−mile.html
> July 2007
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> Human beings can run long distances because we carry multiple copies of a gene
> that helps supply our cells with energy, a new study suggests. That supports
> the idea that endurance running gave our human ancestors an evolutionary

edge.

An analysis of DNA from 10 primate species reveals that, compared with the genome
of chimpanzees and gorillas, our genome includes many more duplicates of a gene
called aquaporin 7 (AQP7), which transports water and sugary compounds into cells. Humans appear to have five copies of this gene, whereas chimps have just
two, and other primates carry only one copy.
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Given the potential influence exerted by extra gene copies, Sikela and his colleagues wondered how humans might differ from other primate species in terms
of the number of duplicates we carry. The team extracted DNA from blood samples
taken from various primates including humans, along with chimpanzees, gorillas,
baboons, lemurs and several others.

The researchers calculated how many copies of various genes each species carries
with the help of DNA "micro−array" technology. If large quantities of the DNA from
a given genome attached to certain parts of the micro−array chip, this indicated
that it contained multiple copies of a specific gene.

After using this method to screen more than 20,000 genes, Sikela and his colleagues
found 84 genes for which the copy number in the human genome differs from that of
other primates.

The AQP7 gene in particular caught their attention. The protein made by the gene
functions as an important channel in the cell membrane. Specifically, the channel
allows water and a sugary compound called glycerol to enter the cell, where they
are used to produce energy. This has the potential to make a difference in long
bouts of exercise, when the body needs to mobilise energy molecules from fat stores.

Given its role in transporting glycerol, the AQP7 gene "would certainly be a good
candidate to be involved in endurance running", says Sikela. He notes that recent
studies have suggested endurance running perhaps gave our ancestors an advantage

over other primates by enabling them to travel better across sweeping African savannahs.
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http://www.newscientist.com/article/dn6681−evolution−made−humans−marathon−runners.html
17 November 2004

We are born to run. According to new research, our bodies are highly evolved for running long distances, an ability that allowed our ancestors to conquer the African savannahs.

Proponents of the theory say that long−distance running may be an even more significant evolutionary adaptation than bipedal walking, an ability which may have emerged with the appearance of the first hominids some 6 million years ago.

It is true that we cannot keep up with the fastest four−legged mammals. The speediest humans can sprint at barely 10 metres per second for just 15 seconds, whereas horses and greyhounds can gallop twice as fast for many minutes.

Yet anthropologists, in focusing on this lack of short−term speed, have overlooked how well adapted we are for endurance running, according to biologist Dennis Bramble at the University of Utah, and his colleague Dan Lieberman of Harvard University.

"Our legs are full of tendons that are not present in other primates," says Lieberman. "You don't use your Achilles tendon when you walk," he says, but it is essential for running. Our buttock muscles, whose large size is a distinctly human attribute, are also vital for running, as they help stabilise the trunk and prevent it pitching forwards.

These muscles too are barely used in walking. Runners also need to keep their bodies cool, which could explain our large number of sweat glands and largely hairless skin.

Many of these adaptations appeared with Homo erectus around 2 million years ago. The long legs, short arms and low shoulders of H. erectus and later humans match the demands of running, while in contrast, the limb proportions of the earlier australopithecines were much closer to those of modern chimps, say Lieberman

and
Bramble.

For example, compared with both chimps and australopithecines, humans have large
leg joints in proportion to body mass. These help dissipate the large impact forces generated by running.

Endurance running is now confined to sport, but Lieberman thinks it gave early
humans an evolutionary edge. Unlike most mammals, or any other primates, we can
run at a reasonable pace for many kilometres, quick enough to keep up with a trotting horse or dog.

That ability may have allowed early humans to scavenge animal carcasses by getting
to them before animals such as hyenas. "Before the bow and arrow, you¹d have a
hard time making a living without running," Lieberman says.

Anthropologist Loring Brace of the University of Michigan, Ann Arbor agrees. He
says that studies of hunter−gatherers show that endurance running to catch prey
is a viable sustenance strategy.

The evidence is clear, we are built for running.

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