Re: Bone density in mustelids

Source: http://sci.tech−archive.net/Archive/sci.anthropology.paleo/2007−12/msg00181.html

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- *From*: Mujin <umwinkl0@xxxxxxxxxxxxxxxxxxx>
- *Date*: Thu, 6 Dec 2007 16:48:35 +0000 (UTC)

Marc Verhaegen <m_verhaegen@xxxxxxxxx> wrote in
news:C37DCD66.A110%m_verhaegen@xxxxxxxxx:

> Our little boy apparently can't tell us why he believes a tool−using
> waterside hominid would not butcher stranded whales or drowned bovids.
> He even believes high−arched feet are for running...
> Never seen a cursorial animal?

I suppose you have an alternative explanation for the arguments given here:

http://www.nature.com/nature/journal/v432/n7015/full/nature03052.html

Abstract:
"Striding bipedalism is a key derived behaviour of hominids that possibly originated soon after the divergence of the chimpanzee and human lineages. Although bipedal gaits include walking and running, running is generally considered to have played no major role in human evolution because humans, like apes, are poor sprinters compared to most quadrupeds. Here we assess how well humans perform at sustained long−distance running, and review the physiological and anatomical bases of endurance running capabilities in humans and other mammals. Judged by several criteria, humans perform remarkably well at endurance running, thanks to a diverse array of features, many of which leave traces in the skeleton. The fossil evidence of these features suggests that endurance running is a derived capability of the genus Homo, originating about 2 million years ago, and may have been instrumental in the evolution of the human body form."

Table 1 and Figure 3 present a summary of the physical differences between modern H.s. and Pan that the authors consider indicative of adaptation to endurance running.

And what of the nuchal ligament?
"Another possible structural modification relevant to running is the nuchal ligament, a convergent feature in Homo (first evident in KNM−ER 1813) and other mammals that are either cursorial (for example, dogs, horses, hares) or have massive heads (elephants). Interestingly, a nuchal ligament is absent in chimpanzees and apparently in australopithecines (as evinced by

the absence of a median nuchal line)."

How does AAH explain the presence of a nuchal ligament in Homo, but not in Pan or A'pith? An aquatic animal doesn't need such a ligament for supporting a massive head, since buoyancy solves that problem, and it certainly doesn't need it to counteract a tendency for the head to pitch forwards since swimming doesn't cause the kind of impact that results in pitching forward.

And here is one critical comparison of Homo sap, Homo erectus, A'pithecus and Pan:

"Many studies have found that compared to both Pan and Australopithecus, Homo has substantially larger articular surface areas relative to body mass in most joints of the lower body, including the femoral head and knee, the sacroiliac joint, and the lumbar centra. Enlargement of these joints, which is not matched in the upper limb of Homo, lowers the stresses that impact forces generate at heel strike during walking, but would contribute more critically to dissipate the much higher impact loads generated in running. Another possible modification of the pelvis for resisting the stresses associated with running is enlargement of the iliac pillar in early H. erectus"

These features are easily explained by endurance running, but I can see no way in which they can reasonably be explained by "slow diving" − perhaps you would like to enlighten us?

Also, would you care to comment on these extracts? Do you have alternative explanations or *evidence* based objections?

"Although not extensively studied in non−humans, ER is unique to humans among primates, and uncommon among quadrupedal mammals other than social carnivores (such as dogs and hyenas) and migratory ungulates (such as wildebeest and horses)"

"Most humans voluntarily switch to running at approximately 2.3−2.5 m s−1, which corresponds closely to the intersection of the COT curves for walking and running in humans (Fig. 2b). At these higher speeds running becomes less costly than walking by exploiting a mass−spring mechanism that exchanges kinetic and potential energy very differently (Fig. 1b). Collagen−rich tendons and ligaments in the leg store elastic strain energy during the initial, braking part of the support phase, and then release the energy through recoil during the subsequent propulsive phase. To use these springs effectively, the legs flex more in running than in walking: flexing and then extending at the knee and ankle during the support phase (Fig. 1a). Limb stiffness relative to body mass in running humans is similar to that of other mammalian cursors."

"Well−conditioned human runners exceed the predicted preferred galloping speed for a 65−kg quadruped and can occasionally outrun horses over the extremely long distances that constrain these animals to optimal galloping speeds, typically a canter (Fig 2a)."

"Fit human amateurs can regularly run 10 km, and longer distances such as marathons (42.2 km) are achieved by tens of thousands of people each year. Such distances are unknown if not impossible for any other primate, but are comparable to those observed in specialized mammalian cursors in open habitats. African hunting dogs travel an average of 10 km per day, and wolves and hyenas travel on average 14 and 19 km day−1, respectively."

"The mass−adjusted COT of human running is about 50% higher than a typical mammal, including other primates...Interestingly, other endurance cursors such as wolves and African hunting dogs also have high mass−adjusted COT relative to the average mammal."

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Bon nou mujin sei gan dan
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