

Re: Fire/Cooking -> Bigger Brains - erectus

Source: <http://sci.tech-archive.net/Archive/sci.anthropology.paleo/2007-12/msg00680.html>

- *From:* "Rick Wagler" <taxidea3@xxxxxxx>
 - *Date:* Mon, 24 Dec 2007 21:10:32 GMT
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"Rich Travsky" <traRvEsky@xxxxxxxxxxxxxxxx> wrote in message
<news:476FEF4F.308108EC@xxxxxxxxxxxxxxxx>

<http://www.sciam.com/article.cfm?id=cooking-up-bigger-brains>

Scientific American Magazine - January, 2008

Cooking Up Bigger Brains

Our hominid ancestors could never have eaten enough raw food to support our

large, calorie-hungry brains, Richard Wrangham claims. The secret to our evolution, he says, is cooking

Richard Wrangham has tasted chimp food, and he doesn't like it. "The typical

fruit is very unpleasant," the Harvard University biological anthropologist says

of the hard, strangely shaped fruits endemic to the chimp diet, some of which

look like cherries, others like cocktail sausages. "Fibrous, quite bitter.

Not

a tremendous amount of sugar. Some make your stomach heave." After a few tastings

in western Uganda, where he works part of the year on his 20-year-old project

studying wild chimpanzees, Wrangham came to the conclusion that no human could

survive long on such a diet. Besides the unpalatable taste, our weak jaws, tiny

teeth and small guts would never be able to chomp and process enough calories from

the fruits to support our large bodies.

Then, one cool fall evening in 1997, while gazing into his fireplace in Cambridge, Mass., and contemplating a completely different question -

"What

stimulated human evolution?" - he remembered the chimp food. "I realized

what a

Re: Fire/Cooking → Bigger Brains – erectus

ridiculously large difference cooking would make," Wrangham says. Cooking could have made the fibrous fruits, along with the tubers and tough, raw meat that chimps also eat, much more easily digestible, he thought—they could be consumed quickly and digested with less energy. This innovation could have enabled our chimp-like ancestors' gut size to shrink over evolutionary time; the energy that would have gone to support a larger gut might have instead sparked the evolution of our bigger-brained, larger-bodied, humanlike forebears.

...
Wrangham, who first encountered chimps as a student of Jane Goodall's in 1970, began his career looking at the way ecological pressures, especially food distribution, affect chimp society. He famously conducted research into chimp violence, leading to his 1996 book *Demonic Males*. But ever since staring into that fire 10 years ago, he has been plagued with thoughts of how humans evolved. "I tend to think about human evolution through the lens of chimps," he remarks. "What would it take to convert a chimpanzee-like ancestor into a human?"
Fire to cook food, he reasoned, which led to bigger bodies and brains.

And that is exactly what he found in *Homo erectus*, our ancestor that first appeared 1.6 million to 1.9 million years ago. *H. erectus*'s brain was 50 percent larger than that of its predecessor, *H. habilis*, and it experienced the biggest drop in tooth size in human evolution. "There's no other time that satisfies expectations that we would have for changes in the body that would be accompanied by cooking," Wrangham says.

...
So Wrangham did more research. He examined groups of modern hunter-gatherers all over the world and found that no human group currently eats all their food raw. Humans seem to be well adapted to eating cooked food: modern humans need a lot of high-quality calories (brain tissue requires 22 times the energy of skeletal muscle); tough, fibrous fruits and tubers cannot provide enough. Wrangham and his

Re: Fire/Cooking -> Bigger Brains - erectus

colleagues
calculated
that H. erectus (which was in H. sapiens's size range) would have to eat
roughly 12
pounds of raw plant food a day, or six pounds of raw plants plus raw meat,
to get
enough calories to survive. Studies on modern women show that those on a
raw
vegetarian
diet often miss their menstrual periods because of lack of energy. Adding
high-energy
raw meat does not help much, either—Wrangham found data showing that even
at chimps'
chewing rate, which can deliver them 400 food calories per hour, H.
erectus would
have
needed to chew raw meat for 5.7 to 6.2 hours a day to fulfill its daily
energy needs.
When it was not gathering food, it would literally be chewing that food
for the rest
of the day.

...
Wrangham's theory would fit together nicely if not for that pesky problem
of
controlled
fire. Wrangham points to some data of early fires that may indicate that
H. erectus
did
indeed tame fire. At Koobi Fora in Kenya, anthropologist Ralph Rowlett of
the
University
of Missouri–Columbia has found evidence of scorched earth from 1.6 million
years ago
that contains a mixture of burned wood types, indicating purposely made
fire and no
signs of roots having burned underground (a tree struck by lightning would
show only
one wood type and burned roots). The discoveries are consistent with
human-controlled
fire. Rowlett plans next to study the starch granules found in the area to
see if
food
could have been cooked there.

...
"It doesn't matter who develops these ideas," says Aiello, who is also
president of
the
Wenner–Gren Foundation, which supports anthropological research. "You have
to listen
to
what Richard is saying because he has some very interesting, original

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data. Sometimes
the most creative ideas come from unexpected places." She points to
Goodall, who
surprised the world by proving that humans were not the only toolmakers.
"It's one of
the best illustrations I know of the value of primate research informing
our
knowledge
of human evolution and adaptation," Aiello says.
...

Anthropologist / archaeologist Randy Bellomo has done
some interesting work on early fire. I couldn't locate his
present locale from a web search but he used to be at
the University of South Florida. If you have access to
some restricted anthro bibliographic databases - I don't -
you should find some interesting citations

Rick Wagler

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