# Do Grandmothers Hold The Key To Understanding Human Evolution?

*Brenna R. Hassett – Photo: en.wikipedia.org*

Of the innumerable species on the planet, just a bare handful have evolved to have one of the most counterintuitive adaptations possible. In a small number of animals, all big-brained mammals, we see something that should not, at first glance, be of adaptive value: animals that have lived *past* the ability to reproduce. This is so clearly contra the main aim of any living species, which is to survive and reproduce, that evolutionary biology has been forced into entirely new theoretical directions in order to explain one of the most baffling phenomena in science: grandmothers.

Why should grandmothers cause such a stir? As humans, we tend to think of them as a natural part of life—and women who are past reproductive age are in fact a critical part of our societies. Most of the women who hold positions of power and respect around the world, be it in politics, culture, family life, or other aspects of society, are at a point in life where they are not involved in the time-consuming business of physically reproducing. But however common we might think women of a certain age are, there is no getting around the fact that they are virtually unknown in the rest of the animal kingdom. One of the hallmarks of evolutionary theory is that success for a species is measured by offspring. Offspring are how

genetic material passes itself through time, and any species that reproduces through combining genetic material is going to have to focus on offspring if it wants to continue. The idea that we deliberately turn off our potential to have children flies in the face of a basic tenet of evolutionary success—that doing well is measured by having children. Yet, even though reproduction is the absolute key to the survival of a species, in humans we give up on reproduction well before the individual itself is done.

It is worth noting that this odd adaptation to living beyond reproduction is really only seen in females. We talk about the oddity of grandmothers but not of grandfathers, because, technically, grandfathers do not outlive their reproductive potential. Despite reduced reproductive success with age, males do not have the same vertiginous shift in hormonal production that females do, and they do not stop producing male gametes (sperm) in the same way that females stop releasing eggs. We know from a vast amount of scientific research on human female fertility that our species really does call time on releasing eggs that can turn into embryos sometime in our fifth decade. Producing those eggs is something that actually happens before we are even born; 7 million potential egg-forming cells (oocytes) in utero become 2 million by the time we are born and are down to about 400,000 before puberty and the hormonal mechanisms even start that would let oocytes become pregnancies. About a thousand oocytes self-destruct each menstrual cycle, but we start with such high numbers that we could in theory keep producing them for 70-odd years after puberty—but we don't. Something intervenes in our species—and only in biological females—to turn off the entire process. The million-dollar evolutionary question is: why?

Up until this year, only humans and a few whale species had ever been shown to have post-reproductive individuals alive and well in their societies—and all of them female. This has led to a flurry of theorizing about what elements of whale and human evolution might have conspired to create such an extraordinary adaptation as a grandmother. Much of the theoretical background on *why* these few species, and only these few species, have individuals that happily live on after reproduction is no longer possible has centered on the role those individuals play in promoting group fitness. The aspect of evolutionary biology that has come in for considerable attention in the issue is the role of *alloparental* care. An alloparent is any animal that does a bit of substitute parenting, be they a biological relative or just another group member. Alloparenting is thought to be

evolutionarily advantageous as it allows for a wider support base for group offspring. This support can come in many forms: from providing protection and resources to offering more teachers and playfellows. In social species—like whales and humans—having extra hands is part and parcel of growing up. And for humans, the most well-known explanation of the utterly unlikely existence of grandmothers was first laid out in exactly those terms.

In 1978, researcher Kristen Hawkes and her collaborators proposed "The Grandmother Hypothesis." Based on Hawkes's own research with the Hadza people, who are mobile within Tanzania and largely forage food rather than farm, she noted that grandmothers had a very special role in Hadza society because they are expert foragers and carers with years of experience. What's more, they don't have children of their own who eat up all those resources. Hawkes's contribution was to note that in families where grandmothers were around to help their own children provide for *their* children—particularly their daughters—those grandkids grew better. Even more important from an evolutionary standpoint was that not only did grandmothers enhance the 'fitness' of their grandchildren, but their support also meant even more grandkids. Here was a proposal that made sense: the adaptive value that allowed for the evolution of post-reproductive individuals is the contribution of those individuals not only to the next generation but also to the generation after that.

The discovery of post-reproductive whales seemed to add weight to the idea that post-reproductive females are a way to get the benefit of older females without the drain on resources that having children entails. Female orcas, false killer whales, and pilot whales all have been observed to have long periods of life after ceasing reproduction, and all species are highly social, with survival depending on the success of each social unit, thought to be mostly led by females. But in whales, the benefit appears immediately, to the whales' own children: adult whales with living mothers do better than those without. For both humans and whales, it seems that post-reproductive females are valuable assets who contribute significantly to the survival of their families. This led to two different ways of theorizing the evolutionary role of grandmothers: that they are adaptive because of the contribution of alloparental care (as in humans), or simply because their knowledge and experience make them better resource-gatherers (as in whales).

In 2023, a group of particularly long-lived chimpanzees waded into the debate. In

the group of chimpanzees living at Ngogo in Uganda, many of the females survived for quite some time beyond the age of 50, which is the usual point at which chimpanzees stop giving birth. A lack of births in these older individuals combined with hormonal evidence from urine samples that shows the same hormonal changes associated with menopause allowed researchers to suggest that these individuals really are post-reproductive. However, in chimpanzee society, grandmothers do not live in the same group as their daughters and so could not help out the same way Hadza grandmothers do. The adaptive benefit to the chimps is less clear, but the researchers have argued that it is the grandmothers themselves who benefit by not having to compete to reproduce. Their work suggests maybe the reason we haven't seen grandmother chimps before is that in most chimpanzee groups, life expectancy doesn't go beyond 50, but at Ngogo, the group has been very successful, with abundant fruit and meat available and most predators (particularly leopards and humans) no longer a threat. This gives us a fascinating insight into the conditions that could have driven our own evolutionary process. Perhaps grandmothers, with their additional resources and valuable experience, are the *result of* species success—and their success becomes the success of their children, their grandchildren, and their species.

*By Brenna R. Hassett*

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*Source:* Independent Media Institute

*Credit Line: This article was produced by Human Bridges, a project of the Independent Media Institute.*