



Creating the Nation's first BioPark

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Letter From the Desk Of David Challinor  
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One of the great joys of having children is when they in turn produce grandchildren. You have heard the old saw, "If I'd known how marvelous grandchildren were, I'd have had them first." As a biologist and grandparent, I was interested in an article in *Science* on the evolutionary role of grandparents, especially grandmothers.

One question to consider is why many women live long after they are infertile (post-menopausal). Under the old strict theory of natural selection, only traits that favor reproduction should persist in a population, yet human mothers live 20 to 30 years after menopause, unlike other female primates who generally do not survive nearly as long as humans after menopause. Long survival times in elderly primate males (humans included) is more easily explained because men tend to stay fertile longer than females do, thereby retaining a trait that favors reproduction.

This interesting subject was considered in-depth last April 1997 at a gathering of anthropologists in St. Louis. Although they found no testable conclusion, most believed that there was a definite role for grandmothers in the reproductive success of their daughters. A discussion arose from a paper by Professor Kristen Hawkes of the University of Utah and her colleagues who spent a year living with and observing the life of a small group of Hadzas, hunger-gatherers living in the hills between two large alkaline lakes (Eyasi and Manyara) in northern Tanzania.

The Hadzas, numbering about 300 people, travel seasonally with the rains, subsisting on roots and berries collected by the women and game and honey furnished by the men. A traditional explanation of the human family's evolution is that the male was the principal provider while the female stayed in camp to care for the babies. Hawkes and colleagues found that the grandmothers actually provided as large and more stable food supply as the male hunters, thereby filling an absolutely crucial niche in the survival of the young. According to anthropologist Robert Trivers, the reproductive strategy of the human female is to produce the best female offspring; among the Hadza, the grandmother's role in her daughter's reproductive success is well illustrated. Perhaps women's longevity developed to insure that their grandchildren had enough to eat. By supplying food, the grandmother increased her daughter's fertility by allowing her to nurse her children for a shorter time. The daughter is thus able to bear more children during her limited fertility, increasing her chances that her genes (and her mother's) will be passed to female offspring.



It may even be possible that menopause evolved in humans so that grandmothers who are no longer nursing their own children have time to help feed their grandchildren. Many of us have vivid images of elderly women waiting in lines for rationed food during war time, or "babushkas" in Russia playing a similar role during the Communist regime, while their daughters were either at work, out of the house, or at home with infants. The very survival, much less weight gain, of the children at home depended on the availability of a grandmother as provider. The theory that non-fertile related and available women can help to insure their family's survival by providing food is difficult to test scientifically, but the available empirical evidence seems to support the hypothesis.

The researchers in Tanzania found that the more time the mother spent collecting food, the faster the weaned children gained weight. However, when the mother began to nurse her newborn, she did not have time to forage for her older children and had to depend largely on her mother's skill to provide food.

This new insight into the role of grandmothers certainly enhances their position in human evolution, but we should not confine our attention to grandmothers alone. In almost all human and most mammal societies there are what ethologists term "non-breeders," which have an important if not essential role in the reproductive success of their group. For example, in many cultures women who are not part of the breeding population regardless of age and irrespective of cause contribute to the support of the group. Widows with children are often economically handicapped until they remarry or their children can help support them. Childless widows or infertile women often suffer low level social status but their contribution to the welfare of their group may be important.

More complicated is the role of lesbian women in hunter-gatherer societies. One assumes that the percentage of homosexuals (non-breeders) in any human population is relatively consistent, but in many societies outsiders have difficulty in identifying and determining their role in the reproductive success (perpetuation) of their group. Similarly, it is difficult to determine the evolutionary role of homosexual men as long as the initial assumption endures that only traits that favor reproduction should persist. However, I believe that human non-breeders have an essential and important function that helps insure the retention and development of our "humanness."

It is clearly difficult, if not impossible, to quantify the causes and effects of human reproductive success, but I think we have by this latest effort progressed in our understanding of the role of grandmothers. By serving as an additional food source

for weaned children, human grandmothers aid their daughters in bearing young more frequently than other primates. Human babies are normally weaned earlier than other primates, which means that they not only have a longer dependent childhood, but that their mothers regain fertility sooner than other primates. All these reasons help support the grandmother hypothesis. Furthermore, this theory directly challenges the long-held tenet that male hunting skill was the critical factor in allowing humans the luxury of such a long childhood dependency. Among the Hadza, plant-based food supplied by grandmothers appeared to be more stable source of nourishment for children than the spoils of hunting. Other hunter-gatherers are being studied to learn whether there is additional data to support the theory, but paleontological evidence clearly will be difficult to find and analyze. Nonetheless, as a grandfather and the spouse of a grandmother, I like to think that even at our age we have an important evolutionary role to play.

Much of the information in this letter has come from an excellent report on the 66th annual meeting of the American Association of Physical Anthropologists written by Ann Gibbons in *Science* 276:535-536, 25 April 1997.

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