

Eusociality, menopause and information in matrilineal whales

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In their recent article in *TREE* [1], Foster and Ratnieks make the interesting proposal that humans should be considered 'eusocial' on the grounds that females spend a substantial part of their adult life reproductively sterile and help their close relatives [1]. The authors consider that menopause, in this sense of the term, is unique among vertebrates to humans. However, female short-finned pilot whales *Globicephala macrorhynchus*, killer whales *Orcinus orca*, and probably a few other species of cetacean, such as sperm whales *Physeter macrocephalus*, have menopause with similar attributes to human females [2–4]. In all these species, reproduction ceases at approximately 40 years of age, although females routinely live on for several more decades. Thus, cetaceans can also be considered eusocial if the term can be used in the context of within-individual classes of reproductives and sterile helpers.

The cetacean species in which menopause is known or probable all have matrilineal social systems in the sense that most of the females spend their lives grouped with their mothers when both are alive [5]. This correlation, and the presence of menopause in these cetaceans which (unlike modern humans) have not faced a dramatic recent change in their living conditions, strongly indicate that menopause is adaptive, and results from the tradeoff between continued reproduction and assisting kin. Given that menopause invariably occurs in these species, the benefits of assisting kin must outweigh the costs of reproductive cessation. What is not clear, however, is how these menopausal grandmothers help. Among menopausal cetaceans, assistance in foraging is not seen [5], and at least in killer whales, defence against predators is

rare. Similar to human grandmothers [1], menopausal cetacean females have experience that might benefit other members of their matriline. The value of this information could explain why females in these species live about a third of their lives as post-reproductive members of their social groups.

The informative role of cetacean grandmothers is consistent with an emerging body of information indicating cultures in matrilineal cetacean species [6]. Thus, in both cetaceans and humans, the storage and provision of information might be the primary function of menopausal females and, thus, the driver of eusociality [1].

References

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