WHY PINNIPEDS DON'T ECHOLOCATE

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Terrestrial bats and aquatic dolphins have evolved highly specialized but different sonar systems to explore their environment. Performance by individuals in both taxonomic groups depends on the evolution of specialized sound production, sound reception, and signal processing mechanisms. For example, dolphins depend on the echoes of their high frequency signals in order to avoid obstacles and pursue prey. High frequency signals are especially suitable for increasing the resolving power of a sonar system used to detect small objects such as fish. Since pinnipeds also forage in dark and murky waters, from an ecological viewpoint it appears cogent to propose that pinnipeds, like dolphins, also evolved specialized sound emissions and hearing abilities in order to echolocate. However, most pinniped species emit low frequency signals that are unsuitable for echolocation, and all experimental tests of the pinniped active sonar hypothesis have yielded ambiguous or negative results. This evidence suggests that the use of active sonar by most pinnipeds is unlikely. Why, then, do dolphins echolocate while pinnipeds do not? While pinnipeds tend to forage independently, dolphins forage more cooperatively and echolocation facilitates cooperative foraging. While pinnipeds attend their young on land and haul out to rest, dolphins must form group defenses for their young that include the use of echolocation to detect predators at a distance. Based on these and other factors, we argue that the amphibious lifestyle of pinnipeds has resulted in their relatively nonspecialized underwater hearing abilities and further note that many pinniped species have evolved either enhanced visual abilities or specialized vibrissae to sense their surroundings. We conclude that pinnipeds are adapted to combine a variety of sensory cues, including passive hearing, with spatial memory in order to navigate, forage, detect predators and communicate under water.