

Mysteries of the abyss:

Whale falls as biodiversity hotspot

by Mario Lebrato

Cetaceans or whales as they are normally known are interesting from an evolutionary point of view, since they are so different from their ancestors. Fur-covered land mammals were once the predecessors of these magnificent creatures that roam the oceans today. They have followed a macroevolutionary transition from a terrestrial to an aquatic way of life, making them the biggest “parcels” of organic matter swimming in the seas. Classified within the Cetacea, this order is divided further into two distinct groups: toothed whales in the suborder Odontoceti, and baleen whales in the suborder Mysticeti. After this brief characterisation, let's leave apart their bioecological classification and peculiarities, and concentrate in an important aspect of their existence. Whales are wonderful animals when alive from different perspectives, however, for the oceans, they constitute the biggest reservoirs of labile organic matter alive once dead. They may be regarded as “micro islands” supporting an ample community of animals depending on their fate: the deep-sea seafloor or the intertidal realm. Wherever they end up, they are not going to be wasted; what is more, they are going to enter the carbon cycle and its pathways, regenerating and coming back as organic matter on their own to an environment that “supported them” for many years.



(Left) Whale carcass in Santa Cruz (California) after 18 months on the seafloor. Note the complete removal of flesh, and the only presence of the whale bones that will support further communities. Note also the numerous hagfishes present scavenging on the remains. (Copyright, Craig Smith and Mike Degruy).

(Right) Whales carcass after 4.5 years showing red mats as well as other filter feeding animal in a reef-stage. (Copyright, Craig Smith).

Whale carcasses bonanza: a reservoir for the ocean

Organic detritus is known to play fundamental roles in the structure and dynamics of all marine ecosystems. The importance of a particular type of organic detritus (i.e., nonliving organic matter) in an ecosystem depends on several key characteristics of the material, including (a) the size of the detrital particles; (b) the origin of organic materials contained within the particles; (c) the available flux of organic carbon, or limiting nutrient, entering the ecosystem in the form of the detritus; (d) the frequency of occurrence of the detrital particles. Dead-whale detritus has remarkable characteristics and thus may play unusual roles in marine ecosystems. The enormous



size of adult great whales provides a refuge from most predators, with the consequence that much of the natural whale mortality may occur from nutritional or disease stresses occurring during migrations. Whale carcasses initially dead at the surface may follow different stages until they reach the seafloor. At the very surface of the ocean they do normally float due to gases produced by the rotten flesh and decomposition processes, and become swollen. They may travel great distances in this state, but in areas patrolled by scavengers, such as in the case of White Shark in the coasts of South Africa and California, they may be severed by their feeding frenzies on such an easy meal. They may constitute in this way an additional food item to their diet, which provides instant energy in the form of blubber. It is observed as seen in the photography