参考译文

鲸类的起源

It should be obvious that cetaceans-whales, porpoises, and dolphins-are mammals. They breathe through lungs, not through gills, and give birth to live young. Their streamlined bodies, the absence of hind legs, and the presence of a fluke1 and blowhole2 cannot disguise their affinities with land dwelling mammals. However, unlike the cases of sea otters and pinnipeds (seals, sea lions, and walruses, whose limbs are functional both on land and at sea), it is not easy to envision what the first whales looked like. Extinct but already fully marine cetaceans are known from the fossil record. How was the gap between a walking mammal and a swimming whale bridged? Missing until recently were fossils clearly intermediate, or transitional, between land mammals and cetaceans.

众所周知，鲸类动物是哺乳动物,如鲸鱼、鼠海豚和海豚。它们用肺呼吸，而不是鳃，属于胎生。鲸类动物呈流线型的身体，后腿的消失，尾片和气孔的出现，这些特征都不能掩饰它们和陆生哺乳动物的相似之处。然而，想知道世上第一只鲸长什么样并非易事，不像还原海獭及鳍足类动物（四肢水陆两用如海豹，海狮，海象）的原貌那么简单。一些完全水生的鲸类动物虽然已经灭绝，但仍可通过化石来对它们进行考察。陆栖哺乳动物和海洋鲸类之间有何联系？近期发现的化石已经可以很清晰地帮助人们了解这个问题，以及他们之间的过渡关系。

Very exciting discoveries have finally allowed scientists to reconstruct the most likely origins of cetaceans. In 1979, a team looking for fossils in northern Pakistan found what proved to be the oldest fossil whale. The fossil was officially named Pakicetus in honor of the country where the discovery was made. Pakicetus was found embedded in rocks formed from river deposits that were 52 million years old. The river that formed these deposits was actually not far from an ancient ocean known as the Tethys Sea.

科学家们通过一些令人振奋的发现重现了鲸类动物几近真实的起源。1979 年，在巴基斯坦北部，一个寻找化石的考察队发掘到了最古老的鲸鱼化石。这块化石被官方命名为 Pakicifus，以纪念人们发现它的地方。这块化石是在一条河的沉积岩中发现的，这条河有 5200 万年的历史，离古地中海不远。

The fossil consists of a complete skull of an archaeocyte, an extinct group of ancestors of modern cetaceans. Although limited to a skull, the Pakicetus fossil provides precious details on the origins of cetaceans. The skull is cetacean-like but its jawbones lack the enlarged space that is filled with fat or oil and used for receiving underwater sound in modern whales. Pakicetus probably detected sound through the ear opening as in land mammals. The skull also lacks a blowhole, another cetacean adaptation for diving. Other features, however, show experts that Pakicetus is a transitional form between a group of extinct flesh-eating mammals, the mesonychids, and cetaceans. It has been suggested that Pakicetus fed on fish in shallow water and was not yet adapted for life in the open ocean. It probably bred and gave birth on land.

Pakicifus 包括一个完整原始动物的头盖骨，它的主人是现代鲸类的祖先。尽管只是个头盖骨，但它却提供了研究原始鲸类动物起源的珍贵信息。这个头盖骨和鲸类动物的很像，但它的下颌骨和现代鲸类略有不同，现代鲸类动物的下颌骨中含有额外的空间储存脂肪或者油脂来吸收水下的声音。Pakicifus 的主人可能会像陆生哺乳动物那样通过张开的耳朵来探测声音。另外，这个头盖骨没有呼吸孔，而鲸类动物有，这便是鲸类动物为了适应水生环境的另一种适应性表现。然而，专家认为 Pakicifus 的其它特征表明它们是已灭绝的食肉哺乳动物（中兽科动物）和鲸类动物的过渡型。有人认为 Pakicifus 靠吃浅水的鱼类为生，未能适应在辽的大海里生活。它们很有可能在陆地进行生育繁殖。

Another major discovery was made in Egypt in 1989. Several skeletons of another early whale, Basilosaurus, were found in sediments left by the Tethys Sea and now exposed in the Sahara desert. This whale lived around 40 million years ago, 12 million years after Pakicetus. Many incomplete skeletons were found but they included, for the first time in an archaeocyte, a complete hind leg that features a foot with three tiny toes. Such legs would have been far too small to have supported the 50-foot-long Basilosaurus on land. Basilosaurus was undoubtedly a fully marine whale with possibly nonfunctional, or vestigial, hind legs.

1989 年，在埃及有了另一个重大发现。人们在古地中海残留的沉积物中发现了另一类早期鲸鱼Basilosaurus的一些骨骸，这些骨骸如今暴露在撒哈拉大沙漠上。Basilosaurus 生活在大约 4000 万年前，比 Pakicifus 鲸鱼晚了 1200 万年。尽管发现的这些骨骼并不完整，但这是专家们第一次在原始动物身上发现完整的后肢，它有三个小脚趾作为的足部特征。可这些后肢还太小，远无法支撑 50 英尺长的Basilosaurus 在陆地行走。因此，Basilosaurus 必定是完全水生的鲸鱼，它们的后肢已经不起任何作用，或者说已经退化

An even more exciting find was reported in 1994, also from Pakistan. The now extinct whale Ambulocetus natans ("the walking whale that swam") lived in the Tethys Sea 49 million years ago. It lived around 3 million years after Pakicetus but 9 million before Basilosaurus. The fossil luckilyincludes a good portion of the hind legs. The legs were strong and ended in long feet very much like those of a modern pinniped. The legs were certainly functional both on land and at sea. The whale retained a tail and lacked a fluke, the major means of locomotion in modern cetaceans. The structure of the backbone shows, however, that Ambulocetus swam like modern whales by moving the rear portion of its body up and down, even though a fluke was missing. The large hind legs were used for propulsionin water. On land, where it probably bred and gave birth, Ambulocetus may have moved around very much like a modern sea lion. It was undoubtedly a whale that linked life on land with life at sea.

1994 年，巴基斯坦报道了一个更令人兴奋的发现。目前已经灭绝的鲸鱼Ambulocetus natans（可以步行的鲸类）4900 万年前曾在古地中海生活过。比Pakicetus 晚大约 300 万年，比 Basilosaurus 早 900 万年左右。幸运的是，被发现的 Ambulocetus natans 保留着完整的后肢。它的后肢很强壮，底部有长足，非常像现在的鳍足类动物。这些后肢使得他们既能在陆地行走又能在海里游行。虽然 Ambulocetus natans 保留了尾巴，但它们缺少现代水生鲸类动物用于行动的主要身体部位——尾片。不过，从 Ambulocetus 的脊椎结构上可以看出即使缺少尾片，它们也能像现代鲸鱼那样通过身体背部的上下摆动来游走。大的后肢通常被当作是水中前行的发动机。在它们可能交配繁殖的陆地上，Ambulocetus 行动起来非常像现代海狮。毫无疑问，鲸鱼是连接着陆地生命和海洋生命的物种。