Whales Still Have No Ancestor

Patrick H. Young*

Abstract

Recent scientific publications have reported the excavation of fossilized anklebones from the perceived whale ancestors, *Pakicetus* and *Rodhocetus*. While previous evolutionary opinions have erroneously concluded that mesonychids are the terrestrial whale ancestor, these new discoveries along with past molecular data, are being used to claim a different ancestral origin for cetaceans. Information about the dental and auditory morphology as well as molecular biology was presented to justify the theory that artiodactyls are the newest terrestrial relative of whales. It is evident from evaluating the available details that there is no convincing argument to conclude that artiodactyls and cetaceans are related via anklebones. Therefore, the scientific data supports the conclusion that cetaceans are not related through evolution to extinct terrestrial creatures such as artiodactyls or mesonychids.

Introduction

Gingerich *et al*. (1983) published an article describing the discovery of an extinct creature proposed to be an ancestor to modern whales. The creature, labeled *Pakicetus* (Figure 1), was excavated in terrestrial deposits of the early Eocene in Pakistan. This disclosure led Gingerich (1983) to publish drawings representing a fully preserved *Pakicetus* as a partially aquatic and partially terrestrial animal. Although the primary remains discovered were cranium fragments including a few teeth, portions of the upper and lower jawbone, and other various skull remnants (Gingerich, *et al*., 1983), the detail and completeness of the drawings were remarkable and demonstrated the presence of an overactive imagination with little adherence to scientific principles (Sarfati, 1999, p. 77).

The excavation of *Pakicetus* provided evolutionists with fresh evidence to justify the perceived evolutionary transition of whales from fully terrestrial creatures to being fully aquatic mammals. Subsequently, several authors introduced supposed transitional forms in other publications concluding that *Pakicetus* was the intermediate between completely terrestrial wolf-like mesonychids and partially to fully aquatic mammals (Berta, 1995; Bajpai and Gingerich, 1998).

The latest proposal for whale evolution is shown in Table I. Certain militant evolutionists continue to promote these creatures as "indisputably recognizable" intermediates of cetaceans, saying they are "large nail(s) in the coffin of creationism" (Domning, 2001, pp. 38, 41). However, the scientific validity of these perceived ancient "walking whales" and their relationships to modern cetaceans have been expertly refuted by creationists in the past and there has been little new evidence to question their previous conclusions (Camp, 1998; Gish, 1995, pp. 198–208; Ham and Weiland, 2001; Sarfati, 1999, pp. 69–78; Sherwin, 1998; and Weiland, 1990). These researchers have pointed to: (1) the lack of time required for evolution to occur due to the closeness of fossil

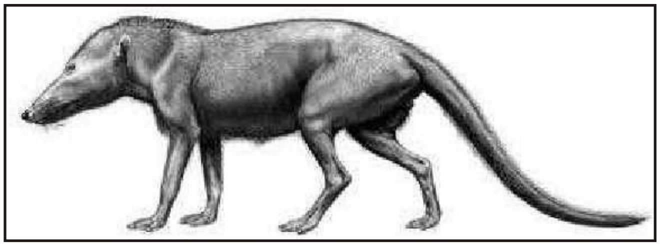

Figure 1: An artist's rendering of the perceived wolf-sized terrestrial ancestor to whales called *Pakicetus*. Illustration by Carl Buell, and taken from http://neoucom.edu/Depts/Anat/Pakicetid.htm

Table I. The Perceived Evolutionary Timeline for Transitions by Fully Terrestrial Mammals to Modern Whales

Proposed Transitional Form		Perceived Time Scale (MYA*)
Mesonychids or Artiodactyls	Terrestrial	55
Pakicetus	Terrestrial	52
Ambulocetus	Partly Aquatic	48
Rodhocetus	Partly Aquatic	44
Basilosaurus	Fully Aquatic	40

*Millions of years ago

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*Patrick H. Young, Ph.D., P.O. Box 89, Circleville, Ohio 43113. pyoung@creationists.org
www.creationists.org/patrickyoung.html

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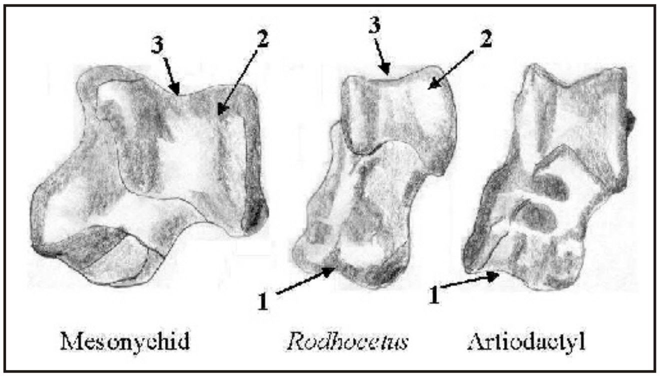

Figure 2: Ankle bone astragali comparison of mesonychids, *Rodhocetus* and artiodactyl. Diagnostic traits consistent with both *Rodhocetus* and artiodactyls is (1) the shape and orientation of the articular surface connecting the astragalus to the calcaneus. Diagnostic traits inconsistent with both *Rodhocetus* and artiodactyls but consistent with mesonychids are (2) a shallower tibial trochea with more rounded trochear ridges and (3) similar astragalar foramen. (Redrawn from Gingerich, *et al.*, 2001)

appearance in the geologic time scale (Eldridge, 1991, p. 168), (2) the fact that *Basilosaurus* is approximately 70 feet long while the other proposed ancestors range from wolf to walrus size (Stahl, 1974, p. 489), and (3) the use of conjecture to interpolate critical missing remains in the fossil evidence (Sarfati, 1999, p. 74). Gish (1995, p. 207) philosophically challenges the transitional conclusion of these creatures by stating:

> It requires an enormous faith in miracles, where materialist philosophy actually forbids them, to believe some hairy, four legged mammal crawled into the water and gradually, over eons of time, gave rise to whales….

Similarities which resulted in several researchers giving transitional status to *Pakicetus* in the past converged on dental and auditory characteristics. Gingerich *et al.* (1983 p. 404) reported, "The tympanic bulla may have been used to some limited extent in *Pakicetus* in the reception of water-borne sound". Others noted a resemblance in the teeth of *Pakicetus* to those of other archeocetes such as *Protocetus* and *Indocetus* (Berta, 1995; Bajpai and Gingerich, 1998). These dental and auditory standards have been referenced for years as intermediary criteria and consequently prepare the way for *Pakicetus* to achieve the transitional rank necessary to validate whale evolution. Several articles were also published proclaiming the conclusion that wolf-like mesonychids are the ancestor to *Pakicetus* via similarities in dentition (Zimmer, 1995; O'Leary and Rose, 1995; Zhou, *et al.*, 1995).

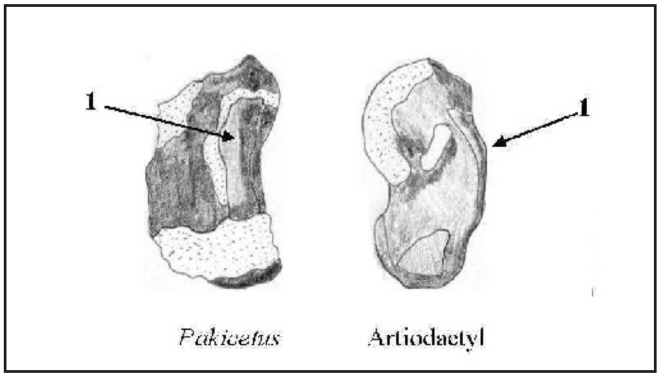

Figure 3: Astralgali of the artiodactyl and *Pakicetus*. (1) is a comparison of the sustentacular facet. (Redrawn from Thewissen, *et al.*, 1998)

The immediate discussion will focus on the morphological and molecular characteristics of mesonychids / artiodactyls and the evolutionary validity of relating them to *Pakicetus* or any other perceived ancient "walking whale."

Discussion

Gingerich *et al.* (2001, p. 2239) reported the discovery of anklebones from a *Rodhocetus* fossil, which they believe demonstrates: "... paleontological evidence showing that whales evolved from artiodactyls rather than mesonychid condylarths." Anklebone morphology is considered by evolutionists to be a primary tool for identifying artiodactyls (Schaeffer, 1947), and these similarities are now proposed to confirm the perceived evolutionary connection of artiodactyls to primitive whales (Harder, 2001). The characteristic in question is a trochlea on the distal part of the astragalus of the artiodactyl. A similar trochleated head on an anklebone is present in the *Rodhocetus* fossil but absent in the mesonychid (Figure 2) (Milinkovitch and Thewissen, 1997).

Later, Thewissen *et al.* (2001) reported similarities of *Pakicetus* to artiodactyls via anklebone affinity. Their conclusions were based on the excavation of four partial *Pakicetus* skulls including 150 isolated post-cranial bones. They stated:

> We use these fossils to show (1) that these archaic cetaceans were land mammals; and (2) that cetaceans are more closely related to artiodactyls than to mesonychians (Thewissen, *et al.*, 2001, p. 277).

Although complete pictures of Pakicetus have been previously published, post-cranial bone fragments have been nonexistent in the past and therefore this discovery represented some of the first remains available for a true scientific study.

For years, creationists have reported mesonychids could not have been the transitional form for whales since the differences they have with cetaceans by far surpass any similarities(Gish, 1995, pp. 198–207; Ham and

Weiland, 2001; Sherwin, 1998; Weiland, 1990). Originally, evolutionists were convinced that the ancestry of mesonychids was convergent with cetaceans, until a study was done in 1997 suggesting a closer relationship of whales to artiodactyls via molecular phylogeny (Shimamura, *et al.*, 1997). The molecular phylogeny technique was developed to create a pathway to identify the organisms with the closest relationships based on DNA, RNA, or protein sequences, with the primary assumption that all organisms are related via common ancestry.

The biologists have heralded these data from the molecular phylogeny technique as conclusive evidence that artiodactyls are more closely related to whales than mesonychids. Paleontologists were not as quick to embrace these conclusions because the fossil data did not support it (Gibson, 2001). Paleontologists also point out that all the DNA sequence analysis was done on extant animals. Since mesonychids are extinct, there is no sequence data to conclude their relationship to *Pakicetus* by molecular phylogeny (Wong, 1999). Furthermore, the results from both molecular and morphological analysis are not able to account for reversals to ancestral conditions. Matching changes in different lineages (homoplasies), can also result in potentially concealing authentic phylogenic similarities (Luo, 2000).

Molecular phylogeny experiments using SINE and LINE retroposons are designed to minimize evolutionary reversals and homoplasy because it is believed the mechanism driving replication is irreversible and unlikely to occur independently (Nikaido, *et al.*, 1999; and Hillis, 1999). However, homoplasy can still occur when character traits develop prior to the perceived speciation event (ancestral polymorphism). Since flanking sequences are used to amplify a characteristic SINE event, mutations from the flanking sequence will make it difficult to resolve the lineage in question. This potential problem is key when older SINE insertions are used to determine a lineage. Older SINE insertions mean more mutations in the flanking sequence resulting in a significant loss of critical information and eventually rendering the data useless (Hillis, 1999).

Evolutionists must now live with a conundrum they have created in the legend of whale origins. The past conclusion of mesonychids being ancestors to archaeocetes was based on dental similarity. Dental similarities between archaeocetes and mesonychids have not changed and are also nonexistent in artiodactyls. Gingerich *et al.* (2001, p. 2242) attempted to address the issue by stating:

> Although there is a general resemblance of the teeth of archaeocetes to those of mesonychids, such resemblance is sometimes *overstated* and evidently represents evolutionary convergence. (my emphasis)

Thewiessen *et al.* (2001, p. 280) attempt their own explanation stating:

> Our analysis implies that the relatively primitive dental morphology of archaic artiodactyls is either a reversal (from a more mesonychian-like morphology) or that mesonychians and cetaceans evolved dental similarities independently.

In other words, they needed a fully terrestrial ancestor of *Pakicetus* to demonstrate their mythical evolutionary pathway to modern whales. Mesonychids were the best guess at the time and the details were exaggerated to prove it. Now they think *Pakicetus* evolved from artiodactyls and they are not exaggerating now!

Evolutionists have also stated that certain portions of the *Pakicetus* auditory system confirms its transitional status to whales and whale ancestors. However, Thewissen *et al.* (2001, p. 278) reported that:

> The Pakicetid middle ear was highly specialized and included pachy osteosclerotic ossicles, an involucrum and a plate like sigmoid process. These features have been interpreted as adaptations for underwater hearing, and it has been suggested that the presence of an involucrum facilitates underwater high frequency transmission in modern odontocetes even though the involucrum is also present in low frequency mysticetes. In the case of pakicetid, the absence of air sinuses insulating the ears, the firm fusion of the periotic to the surrounding bones, and the presence of a flat tympanic membrane suggest that reception of airborne sound is well developed, but are *inconsistent* with good underwater hearing. It is most likely that the specialization's of the Pakicetid middle ear are analogous to those of some subterranean mammals… Some features of the sense organs of Pakicetids are also found in aquatic mammals, but they do not necessarily imply life in water. (my emphasis)

This type of hearing in *Pakicetus* clearly establishes it as a fully terrestrial animal without any of the sensitive auditory components present in modern whales. One small bone in the ear of *Pakicetus* has been hailed as the transitional element to modern whale's ears. This claim however, could easily be construed as "overstatements" or an example of "evolutionary convergence."

Today's whales contain several unique characteristics including the following: a highly vascularized sinus to sustain pressure when diving to great depths (Gish, 1995, p. 206), a complex directional auditory system, and the ability to echolocate underwater (Meyer, 1997). Studies also confirm the existence of a heat exchanger type thermoregulation system in the tongue of grey whales that allows them to feed in very cold waters without significant heat loss (Heyning and Mead, 1997). These types of features are not observed in any of the proposed whale ancestors to date, nor is there any proposed transitional pathway to achieve this type of complexity.

In the past, any transitional status of *Pakicetus* to whales was linked via dental similarities. These similarities have now been proven false or have at least been demoted. There is also no evidence of any evolutionary pattern remotely suggesting *Pakicetus* is an ancestral relative to either ancient or modern cetaceans when comparing their post-cranial remains (Woodmorappe, 2002). Although there has been no change in the similarities in the dentition of *Pakicetus* and the mesonychids, evolutionists now allege their earlier mistaken evaluations were the result of overstatements, evolutionary convergence, or independent evolution.

Ear bone similarities have also been a past fundamental characteristic supposedly demonstrating the ancestral tie of *Pakicetus* to primitive whales. This also appears to have been an embellishment and downgraded to secondary or tertiary status (Woodmorappe, 2002).

Thewissen *et al.* (2001), and Gingerich *et al.* (2001) presently report that resemblance's of the anklebones are the principal elements linking artiodactyls to *Pakicetus* and subsequently to *Rodhocetus*. Curiously, Thewissen *et al.* (1998, pp. 452–453) appear to contradict this claim, having stated in a previous article that:

> The cetacean astragalar head is wide and nearly flat both mediolaterally and dorsoplantarly. This is *unlike* the condyle of mesonychians, but is also *unlike* the convex trochleated head of artiodactyls. This important feature, often cited as the main defining character of artiodactyls, is *inconsistent* with the hypothesis that cetaceans should be included in the artiodactyls. The cetacean sustentacular facet resembles that of artiodactyls in being long, but *unlike* that of artiodactyls it is narrow. (my emphasis)

These statements by Thewissen *et al.* (1998) are in direct opposition to the conclusions in the Thewissen *et al.* (2001, p. 279) article where they state that:

> Our new fossils show that these defining characteristics do not only occur in all artiodactyls, but are also present in basal cetaceans. These ankle characters (deeply grooved proximal trochlea, dorso-plantar rotation plane of trochleated head, rectangular and wide sustentacular facet….) have high consistency indices (1.0).

In the same article, Thewissen *et al.* (2001, p. 280) attempted to justify their contradiction by stating: "This bears out the prediction that widespread homoplasy occurred in one organ system in the early evolution of the clades in question." It appears that every problem can be explained by homoplasy!

Gingerich *et al.* (2001, p. 2242) attempt to minimize the dilemma remarking as follows:

> Inferences that astragali of pakicetidae and ambulocetidae are artiodactyl-like have been questioned because the bones involved are fragmentary and not associated with diagnostic cetacean material.

While Gingerich was accurate in concluding that the remains were fragmentary, critical anklebone areas such as the sustentacular facet shown in Figure 3, are well preserved (Thewissen, *et al.*, 1998). Furthermore, if the bone fragmentations were this disastrous, it would have been irresponsible for Thewissen, *et al.*, (1998) to propose a conclusion at all.

Although there are some similarities in anklebones of artiodactyls and *Rodhocetus*, there are also several crucial differences (Figure 2). Rose (2001, p. 2216) states that:

> Primitive mesonychid-like traits present in ancient whales, but not in any known artiodactyl, include a shallower tibial trochlea with more rounded trochlear ridges and retention of a remnant of the astragalar foramen, the opening of a canal through which a nerve and vessels pass in primitive mammals.

Noting the complete lack of transitional evidence in the fossil record, University of Michigan paleontologist William J. Sanders stated that:

> The earliest known fossil branching of hippos (artiodactyls) was 15 to 1 million years ago and the earliest whales more than 50 million years ago in the Eocene epoch. Thus, if whales and hippos shared a common ancestor, it would have to have persisted for at least 32 million years—but there is no fossil evidence for such a creature spanning that immensity of time (Wong,1999, p. 27).

Conclusion

From an evaluation of the available data, it is evident that a relationship between artiodactyls and cetaceans based on anklebones is not a convincing argument. Furthermore, the molecular data suggesting that cetaceans descended from artiodactyls was not convincing to the morphologists until anklebones were discovered.

Homoplasy, evolutionary reversals, and ancestral polymorphism appears to be used abundantly as a crutch to justify numerous "walking whale" character traits that do not follow traditional evolutionary dogma. The dentition similarities of *Pakicetus* and mesonychids were once primary criteria used to conclude they were evolutionary relatives. Now these same characteristics are considered irrelevant homoplasy for no good scientific reason.

Genesis 1:21 says: "And God created great whales, and every living creature that moveth, which the waters brought forth abundantly, after their kind…". After evaluating all the pertinent information, one can only conclude there are both similarities and significant differences in the dental, auditory and anklebone data for whales and their proposed ancestors.

Therefore, the morphological and molecular pathway for perceived whale evolution continues to be in turmoil and the latest research has done little to resolve the confusion. On this basis, the biblical conclusion that whales and their supposed evolutionary ancestors were divinely created as separate kinds is still the most valid scientific theory.

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Definitions

Archeocetes: primitive whale.
Artiodactyls: Even toed ungulates (hoofed) with a double pulley ankle e.g. sheep, cows, hippos.
Astragalar foramen: the opening of a canal though which a nerve and vessels pass in primitive mammals.
Astragalus: the bone of the ankle that articulates with the bones of the leg
Condyle: A rounded bone prominence that functions in articulation
Dorsoplantarly: transverse plane of the foot
Flanking sequence: The immediate or neighboring upstream or downstream sequence from a designated structure such as a SINE or LINE.
Homoplasy: character state that rose independently in several different taxa
Involucrum: a new bone formation.
LINES: Long interdespersed elements.
Mediolaterally: Sagittal plane of the ankle
Mesonychids: Even toed ungulates (hoofed) without a double pulley ankle but adapted for running
Mysticetes: toothless whales.
Odontocetes: toothed whales.
Pachy-osteosclerotic ossicles: middle ear.
Periotic: bones immediately around the inner ear.
Retroposon: A DNA segment carried within chromosomes capable of copying itself to RNA and then synthesize DNA via reverse transcriptase.
SINES: Short interdespersed elements.
Sustentacular facet: supporting face of the astragalus
Tympanic bulla: inner ear bone.
Trochlea: pulley-like anatomical structure.

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Book Review

How The Universe Got Its Spots by Janna Levin

Princeton University Press, Princeton, NJ. 2002, 208 pages, $22.95

Janna Levin is an Advanced Fellow in the Department of Applied Mathematics and Theoretical Physics at Cambridge University. She received her Ph.D. in physics from Massachusetts Institute of Technology. It is obvious she is a second generation Big Bang believer. Her only departure from the mainline standard theory is that she believes the universe is finite. This belief, I assume, is largely driven by her mathematical specialty of topology. Topology is the study of surfaces and if the universe is infinite it will have no surface for her to theorize about. She is a devout evolutionist, even offering the question, "Could there be Darwinian explanations for our size in the cosmos?" (p. 159). The closest she comes to recognizing creation is the anthropic principle (p. 160), the idea that there is innate design in the universe found in the values of fundamental constants. However in several places (pp. 49, 70, 74, 159) she personifies nature and the universe as having the necessary creative and design capabilities to accomplish evolution. She even makes the statement, "Maybe on one [planet] with optimal conditions, complex molecules form and an inanimate broth waits for the sparks to generate organic life. *Voila*. A few hundred million years later, Africa blooms and here we are" (p. 71).

The book subtitle is "Diary of a Finite Time in a Finite Space". This is appropriate because the book is written in diary format over a period of 28 months during 1998-2001. Actually it is a compilation of letters Levin wrote to her mother while on assignment with Cambridge University's Cosmology Group whose leader is Steven Hawking. In this format Levin makes a successful attempt to write about complex mathematical subjects in terms a layman can understand. She also includes personal information not relevant to the subject throughout the book, and readers may be interested in how a theoretical physicist lives in the real world and our modern society.

The first half of the book is a review of the standard Big Bang theory starting with topics like infinity, relativity, gravity, quantum mechanics, black holes, and the pillars of the Big Bang (universal expansion-redshift, cosmic background radiation, nucleosynthesis of hydrogen and helium, and formation of galaxies and large-scale structure). In chapter 9 titled Beyond Einstein she introduces the new material that her work is developing. She starts by describing how the theory of general relativity inevitably leads to an initial singularity which limits application of the theory itself. Only with the integration of quantum phenomena can the current theory of gravity survive in the vicinity of a singularity. Where this new integrated theory will lead is not obvious as she writes, “Theorists, observers, and experimentalists disperse like headless chickens, or scattered ants to do what they can” (p. 100). Then she introduces topology’s role in the efforts to come up with a unification theory of the universe. As gravity is associated with geometry of space, topology is associated with the outer form and connectivity of the universe.

In chapters 10-13 Levin discusses topology of one to three dimensional spaces and what each new dimension adds to the possible topology of space. Each new dimension allows more idealized examples of finite spaces with their own topology. With three-dimensional spaces there are three categories of topologies: flat, positively curved and negatively curved. There are only seventeen possible flat spaces, a countable infinity of positively curved spaces, and a larger infinity of negatively curved spaces. A countable infinity means that mathematicians have devised a counting routine or prescription that can generate all the variants. Such a prescription does not exist yet for the negatively curved spaces. Besides cataloging the infinity of possible 3-D spaces, topologists look for ways to identify the curvature of the space we live in by recognizing its unique characteristics. But the possibility of doing this depends on how big the universe really is. As Levin states “If the volume of space is huge, then we won’t be able to see far enough into the universe to perceive the topology” (p. 146). But she thinks “space is finite and the perfect polygons are mathematical idealizations that allow us to pursue the implications either to the point of absurdity or to the point of discovery” (p. 147).

The remaining chapters are based on Levin’s conjecture that the universe is finite spacially and of a size where someday we will be able to see the characteristics needed to show its actual topology. She writes about how researchers are proceeding in the search for these characteristics. She includes the added dimensions of string theory and shows how they complicate the search. She also discusses the theory of how animals evolved their spots biologically and proposes that the universe got its structure in a parallel way. She does not see the flaw in logic that animal spots (a design) could not evolve without a designer. Levin describes what the discovery of the topology of the universe would mean for mankind and the future of this universe. The last concept she addresses is the fourth dimension of time. She states, “Time can start over again only on a scale set by the largest cosmological forces. Only a universe that can naturally return to its own infancy could be consistent with a closed time loop” (p. 196). This statement demonstrates that even evolutionists that believe the universe is finite in space have to believe it is never ending in time to avoid admitting there was a beginning (creation) and there also will be an end.

Del Dobberpuhl
Van Andel Creation Research
Center, 6801 N. Highway 89
Chino Valley, AZ 86323