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Manatees
A Unique Animal that Confounds Evolutionists

By Jerry Bergman

Manatees (family Trichechidae, genus *Trichechus*), often called sea cows, are large, fully aquatic, mostly herbivorous marine mammals. Three living species exist, the Amazonian, West Indian, and the West African manatee. These are huge animals weighing from 400 to 550 kilograms (880 to 1,210 lb), and 2.8 to 3.0 metres (9.2 to 9.8 ft) long. The females tend to be both larger and heavier.

In many ways manatees are unique compared to all other life forms, a fact that poses major problems for evolutionists. It is almost like a designer selected their traits from a wide variety of existing life forms, from reptiles to fish to mammals. For example, manatees feed almost entirely on aquatic plants and that is "unique among living marine mammals" (Berta, 2012. *Return to the Sea: The Life and Evolutionary Times of Marine Mammals*. University of California Press. Berkeley p. 127).

They are also the only animal known to have a vascularized cornea (Ambati, *et al.*, 2006. *Nature* 443: 993-997). Also like elephants, female manatees have two teats, one under each flipper (Shoshani (editor), 1992. *Elephants: Majestic Creatures of the Wild*. Rodale Press). Manatee have a total of 24 to 32 flat, rough-textured teeth and lack front teeth, but behind the lips on the roof of the mouth are dense, ridged pads that can tear through ingested plant material. Their diet of gritty vegetation abrades the teeth, particularly the enamel crown.

To solve this problem, the posterior molars erupt at the back of the jaw and slowly move forward like a conveyor belt to replace worn enamel crowns, which fall out of the front of the jaw. This process, called polyphyodonty, continues throughout their life and occurs only in two very different terrestrial animals, kangaroos (Penny, 2002. *The Secret Life of Kangaroos*. Raintree Steck-Vaughn) and elephants. This is one argument used to support the conclusion that manatees and elephants evolved from some hypothetical common ancestor (Shoshani,

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Earthquakes, Fossils, Flood + Scripture

People came from hundreds of kilometres away to hear Dr. Steven Austin speak at CSAA's Creation Weekend in Edmonton in October. His first lecture on Friday evening, October 24 was on the global flood model, also known as catastrophic plate tectonics. This model provides an explanation for how the earth came to its present state (as a re-

sult of a worldwide flood). The model was first proposed in a paper in 1994. There were six authors, Drs. Steven Austin, John Baumgardner, Hubert Humphreys, Andrew Snelling, Larry Vardiman and Kurt Wise (each representing different relevant technical areas of expertise).

Global Flood Model

The idea that originally there was just one connected land mass on earth, was first proposed by Antonio Snider in the 19th century. He lived in the U.S. but he could not find a publisher there for his book *Creation Mysteries Revealed*. So he published it in French in France (1859). The book was

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1992; McDonald, 1984. *The Encyclopedia of Mammals.* Facts on File pp. 292-298).

Their small, widely spaced eyes are covered with eyelids that close in a circular manner like a microscope light diaphragm (McDonald, 1984). Its paddle-shaped tail is the clearest visible difference between manatees and other sea mammals, such as dugongs; whose tail is fluked similar to a whale tail. Manatees have six cervical vertebrae (Hautier, et al. 2010.*PNAS* 107 #44: 18903-18908), a trait found only in two and three-toed sloths. All other mammals possess seven cervical vertebrae (Frietson, 1999. *J. of Experimental Zoology* 285 #1: 19-26).

Manatees are herbivores that consume over 60 different freshwater plants. They use their large, flexible, prehensile upper lip to gather their food, as well as for social interactions and communication. The upper lip pad is split into left and right sides that can move independently.

They use their flippers to "walk" along the water floor while digging for plants and roots. When an appropriate plant is detected, they employ their flippers to scoop the vegetation toward their lips. Their lips then use seven muscles to manipulate and tear the plants into consumable sizes, and their front flippers then move the plants into the mouth. Adult manatee commonly consume up to 10 to 15 percent of their body weight daily. Consuming about 50 kg of food requires grazing for up to seven hours every day.

Like horses, they have a simple stomach, but a large cecum to digest tough plant matter. Their 45-meter long intestines are unusually long for mammals of their size. Digestion of their food causes manatees to produce enormous amounts of gas, which contributes to their barrel-shape.

Apart from mothers with their young, or males following a receptive female, manatees are generally solitary animals (McDonald, 1984), spending close to half of the day sleeping submerged, surfacing regularly for air at 20-minute intervals. The remainder of their time is spent grazing in shallow waters at depths of 1–2 metres (3.3–6.6 ft). Manatees inhabit the shallow, marshy coastal areas and rivers. They generally swim at about 5 to 8 kilometres per hour (3 to 5 mph), but can swim as fast as 30 kilometers per hour (20 mph). They typically breed once every other year; generally a single calf is born. After a 12-month gestation, a further 12 to 18 months is required to wean the calf (McDonald, 1984). Some species can live as long as 60 years.

Another trait unique among living aquatic mammals is their high density bones, particularly the ribs, which contain little or no marrow. These bones provide the animals with ballast or negative buoyancy to allow them to feed and to rest near the water bottom.

Manatees have good long-term memory and are capable of discrimination tasks and complex associative learning (Gerstein, 1984. *Marine Mammals* 1: 10-21), similar to dolphins (Carwardine, 2002. *Whales, Dolphins and Porpoises.* New York). They emit a wide range of sounds used to communicate with other cows and their calves. In addition to sight, sound, touch and taste, smell can also be used for communication. During winter they seek warm, spring-fed rivers for warmth. Prolonged exposure to water temperatures below 68 °F (20 °C) causes stress and

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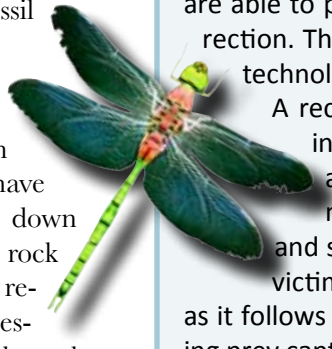
death. The main causes of their death are human-related, including habitat destruction. Their slow-moving, curious nature, coupled with dense coastal development, has led to many violent collisions with propeller-driven boats and ships, usually with large vessels that do not have protective skegs in front of the propellers (Flewelling, et al, 2005. *Nature* 435: 755-756).

Manatees hear a higher frequency than expected for a very large marine mammal. Unfortunately, large boats often emit very low frequencies, which confuse them. The low frequency propeller sounds are also not discernible near the surface where most accidents occur. Manatees usually swim away from boats with a higher frequency.

Manatees are aquatic mammals, all of which are assumed to have evolved from terrestrial mammals because the theories that propose their evolution from fish are even more problematic. To evolve from a terrestrial animal requires enormous anatomical and physiological changes, none of which has been documented in the fossil record, but only assumed.



Manatees and other Sirenians (including dugongs from the Red Sea to Taiwan and northern Australia) have a fossil record extending down to lower levels of Eocene rock (Berta, 2012, p. 128). Fossil remains of their assumed ancestors have been "dated" back to about 45 million years by evolutionists, about the same level as the manatees themselves. This putative long fossil record provides no hint of evolution from an alleged common ancestor (Domning, 1994. *Proceedings of the 1st International Manatee and Dugong Research Conference*, Gainesville, Florida 1-5). All Sirenia are thought to have evolved from some four-legged land mammals over 60 million years ago.

Their closest living relatives are assumed to be the Proboscidea (elephants) and Hyracoidea (hyraxes). Although the fossil record lacks evidence of their transformation into sea mammals, this major problem is explained by rationalizing that they "rapidly evolved into fully aquatic animals," (Berta, 2012, p. 129), so rapidly that no fossil record remained! Of course, lack of evidence is not evidence.

So much speculation about their evolution exists that is unconstrained by fossil evidence that the leading manatee researcher, Dr. Daryl Domning, admitted he could only construct a "speculative" evolutionary history of the manatees (1982. *J. of Paleontology* 56 #3: 599-619). But speculation does not make good science. Obviously there is no good evidence that manatees ever evolved.

Dragonflies - Fancy Catchers

The ball arcs into the air, and then downward. A player rushes forward. Whew!! Another save made. The player's strategy was to move to intercept the ball as it follows a predictable trajectory downward. We are happy the ball was caught, but the situation was not complicated. This is called a "constant bearing strategy" in pursuit of a target moving in a predictable arc. The strategy becomes more serious however when we learn that many animals similarly catch their prey by converging on the straightforward escape route of the hapless victim.

Of course there are plenty of situations where the prey zig and zag. Does this leave potential predators facing starvation? Obviously not. Many predators have been provided with complicated pursuit strategies. Most are animals with backbones, for example echolocating bats. They not only are able to predict trajectories, but they also can react to changes of direction. Their skills are like those of some guided missiles. That is fancy technology!

A recent study has now shown that dragonflies also have amazing tracking abilities like bats and missiles. This is no simple achievement for these insects. It means that they have built-in mathematical models in the brain. Apparently the direction and speed of prey cannot be measured solely from looking at the victim. Instead the insect assesses these things from its own body as it follows the prey. "Their bodies and heads move independently during prey capture, with the head remaining locked onto its target while the body manoeuvres into the optimal orientation for capture." (*Nature* Jan. 15/15 p. 279) The insect "aligns its body and bearing to the prey's direction of motion while remaining directly below the prey and closing the vertical distance to it." (p. 337) "The key parameters for steering thus appear to arise primarily from prediction and estimation processes." (p. 337) These "forward models in which an animal predicts how its own actions will affect its sensory feedback -- had previously been demonstrated only in vertebrates." (p. 280)

In less than half a second, the insect victim falls into the hairy front legs of the predator rising to it from below. Such mathematical skills in so small a brain certainly beg the question who conferred these talents on this creature?

Earthquakes, Fossil

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universally ignored. Then in 1910 European Alfred Wegner published a book on the similar idea of "continental drift", but it was vilified by geologists for 50 years.

Geological opinion changed however in the late 1960s. The new science was now called "plate tectonics." Later a Ph.D. student at UCLA developed a 3-D computer model which simulated the motions of earth's mantle. The model theoretically divided the globe up into tiny icosahedral components. For each component, the Cray supercomputer at the university calculated temperature, pressure, density, viscosity and velocity. As conditions changed at any location, the computer calculated co-responding changes everywhere else. Dr. Baumgardner graduated from UCLA in 1983 and was shortly appointed scientist at Los Alamos National Laboratory. His model was then put to good use in the supercomputers at the national laboratory. The interesting thing is that the model, when run at a high speed, is useful for understanding how the continents separated and the whole earth was inundated during the flood of Noah.

Dr. Austin reviewed the mineral content of crustal and mantle rocks which could make the catastrophic plate tectonics happen. The original ocean floor sank into the mantle, causing friction and churning within the mantle, so that the continents were ripped apart. A new hotter ocean floor expanded upwards driving ocean waters and sea bottom sediments over the continents. Later the new ocean floor cooled and sank so that the waters then rushed off the land back into the sea.

Dr. Austin also discussed numerous examples of geological phenomena that fit the model. For example he noted the Sauk sequence, Cambrian sandstone which nestles around and partly buries the Canadian shield. The latter is a granite type rock in a giant horseshoe pattern which surrounds Hudson's Bay. The sandstone extends from the Arctic in the west, to the southern US (Tapeats sandstone in Arizona) and up into Quebec in the east.

Day of the Cross

On Saturday morning Dr. Austin discussed five signs of the day of the cross. He first discussed the date of these events concluding that it was April 3, AD 33. The events included three hours of darkness beginning at noon, the temple veil torn, an earthquake, a lunar eclipse and Jesus dying on the cross. The prophet Amos had foretold the darkness and earthquake (ch. 8: 8 , 9). Nobody knows what caused the darkness. It was not a solar eclipse because the full moon was on the wrong side of the earth, and the darkness lasted three hours instead of 7 minutes that a typical solar eclipse lasts.

Then at 3:20 pm the moon entered earth's shadow. At 6:20 pm on that day, the moon rose in partial eclipse and it was red. This was foretold by the prophet Joel, Dr. Austin said, in chapter 2:30,31 and the apostle Peter referred to these events in Acts 2: 19 and 20. Apparently there is software available from NASA with which one can calculate the date of that eclipse (see//eclipse.qsfc.nasa eclipse). In similar fashion Dr. Austin discussed the other signs on his list.

Grand Canyon

The third lecture dealt with what we see at Grand Canyon and what these details suggest. The deep layers of sedimentary rock, he said, were de-

posited quickly. A number of studies have demonstrated for example that the cross bedded deposits in the Navajo, Coconino and Tapeats sandstones were formed under deep water moving at catastrophic rates of 1-3 m/second. Such a phenomenon is observed today only in very narrow water channels, not over a huge territory such as this. Similarly he discussed the Redwall limestone with a 320 km long bed of nautiloid fossils (on average 1 fossil/m^2). It appears that the squid-like animals were entombed by a wave of sediment sweeping into the area at a rate of about 7 m/second. These animals did not stand a chance!

In connection with the rocks of Grand Canyon, Dr. Austin also discussed evidence for major earthquakes including uplift of the plateau; erosion (such as sheet erosion as the flood waters retreated); volcanoes on the upper rim (which lend themselves to radiometric dating studies); and an exponential decline in all these phenomena since the time of the flood.

Jerusalem Earthquake of AD 33

The record of past earthquakes in the vicinity of Jerusalem is preserved in the muddy sediments of the Dead Sea. Each year the sediments falling to the sea bottom during summer are a different colour from those in the winter. Each couplet lies smoothly on top of the preceeding deposit unless an earthquake occurs. The more extreme are the ripples or folding at a given level, the stronger and closer was the earthquake at the time those sediments were being laid down. The retreating waters of the Dead Sea in recent years means that deep deposits are now exposed that can be studied. A lengthy record of earthquakes in the Holy Land is now available for study.

The record in the sediments obviously needs a clear benchmark from which to figure out other events. The largest quake in the area during the last 2700 years was the event of 31 BC which was described by Josephus. It must have been about magnitude 7 because it ruptured 110 km along the Jericho fault with a vertical displacement of 3.5 m along the fault. There is no mistaking the resulting contortions in the Dead Sea sediments.

Another major earthquake occurred in 110 AD. Counting the layers between these major disturbances, one comes to the disturbance of AD 33 which was greatest at the northern end of the Dead Sea, only 64 km south of Jerusalem. From the pattern of disturbance, Dr. Austin estimates that the magnitude was about 6. The Bible describes 3 earthquakes that year, the one on Good Friday, the one on Easter Sunday, and one during the summer, described in Acts 4:31.

The beauty of the Dead Sea sediments is that nothing except earthquakes disturbs the smooth appearance of the thin layers. Nothing lives in these salty bottom sediments, so there are no creatures to disturb the tranquility of the deposits. Dr. Austin's research is ongoing, and with local collaborators in Jordan, he hopes to study more earthquakes mentioned in the Bible such as the one mentioned in Amos 1:1 which occurred about 8 centuries prior to the time of Christ.

Dr. Austin's lectures illustrate so well how exciting it is to be a Christian geologist with such a wide variety of topics to study. There has been little interest for example from other scientists in studying the Dead Sea sediments, because other people are not asking the questions that Dr. Austin is asking. Now is the time for many young people to become qualified to continue these fascinating fields of study.

Upside Down Source of Fancy Photosynthesis

By Margaret Helder

During the 1960s and 1970s, improved strains of wheat and rice resulted in a doubling of crop yields. Despite predictions of disaster from some environmentalists, the world continued to feed quickly growing human populations. This green revolution, kick-started by the research of American plant scientist Norman Borlaug and Indian rice geneticist M. S. Swaminathan, provided much higher yielding crops. However for optimum growth, these crops require the widespread application of nitrogen fertilizers and other chemicals. As a by-product of this practice, a significant amount of fertilizer ends up in natural waterways. As a result, scientists now consider the application of such chemicals as "so last century!" (*Nature* October 30, 2014 p. S52). The hunt is now on for crops that do not require chemical inputs and yet produce high yields.

This story begins in the early 1960s in Brisbane, Australia where two scientists who were working at the Colonial Sugar Refining Company, set out to discover why sugar cane produces and stores so much sugar. By 1965 they had discovered and described a new biochemical process in plant leaves that results in much more efficient capture of the sun's energy resulting in enhanced storage of sugar. This new photosynthetic process, called the Hatch-Slack pathway after its discoverers, has been discovered in about 20% of all plant species. Its occurrence however is very patchy. Some species in a taxonomic group may display this capacity and others not. These efficient plants, called C4 plants, grow best at higher temperatures and they manage with less nitrogen inputs and less water. (The terms C3 for normal plants and C4 for efficient plants, refer to the number of carbon atoms in the first product during the photosynthetic process.) Corn, millet, sorghum and sugar cane are all C4 plants, as are many other grasses. Rice however is a C3 plant. Not surprisingly, plant breeders think longingly about how nice it would be if rice were a C4 crop too. Farmers might be able to obtain 30-50% increases in yield with no increases in water, fertilizer or land. But the differences between C3 and C4 plants are major . Two additional chemical reactions are required before photosynthesis actually begins and some anatomical changes are required as well. This is no small research project.

A new initiative makes use of a highly surprising source of efficient photosynthesis. Since the 1970s, scientists have known that blue green algae, now called cyanobacteria, exhibit C4 photosynthesis. What they have since discovered is that the most important enzyme (called Rubisco) for short, exists in a much more efficient form in C4 land plants and cyanobacteria. The C4 enzyme does need a higher amount of carbon dioxide present for it to work efficiently, but there are anatomical and biochemical design features that compensate for this need.

In the cyanobacteria, we find tiny carbon concentrating mechanisms which maintain elevated carbon dioxide levels around Rubisco. Thanks to the carbon concentrating mechanisms, cyanobacteria are able to utilize a form of Rubisco that is almost three times as efficient as that found in C3 plants.

In cyanobacteria, special pumps encourage the uptake of bicarbonate ions (HCO_3) and carbon dioxide into the cell. All this then enters small structure in the cell called carboxysomes which reconvert the bicarbonate back into carbon dioxide. The Rubisco which is located in the structures, acts on the carbon dioxide which eventually results in lots of sugar. What the English and American researchers want to do, for starters is to insert genes from the

blue green algae/cyanobacteria into tobacco plants. This plant is popular as a subject for experiments, the plant equivalent of a guinea pig! Thus the scientists have successfully knocked out the gene for a large component of Rubisco from the tobacco plant, and replaced it with the gene for the cyanobacterial enzyme. They also inserted a gene for a "chaperone" protein which encourages the Rubisco protein to fold properly. If a protein does not fold correctly, it cannot function.

In order to achieve a successful C4 system however in plants like tobacco, scientists will need to add (in addition to the cyanobacterial form of Rubisco), proteins to form the shell of the carbon concentrating structures (carboxysomes) along with the pump proteins and also other proteins which facilitate the conversion of bicarbonate into carbon dioxide at a point adjacent to the Rubisco. These precise and complex requirements mean that scientists do not expect any successful crop plants for many years to come. The functioning system certainly has the hallmarks of intelligent design! Chance processes are not going to make the conversion happen!

It is amusing to reflect on the source of the efficient Rubisco enzyme. We can see that blue green algae/cyanobacteria are highly sophisticated organisms with a fancy photosynthetic apparatus. Yet their outward appearance is uncomplicated and most scientists have long considered that these cells are among the most "primitive" organisms that we know about. Some scientists suggest that cyanobacteria were among the first living cells to appear. It is all the more ironic that scientists would like to improve the efficiency of crops like rice, by inserting a number of genes for C4 photosynthesis from cells that supposedly come from the base of the evolutionary tree. What we actually see from all of this is that photosynthesis is an amazing process which obviously never arose by chance.

Voyager I finally did it!

Launched in 1977, the two Voyager probes have seen some strange and unexpected sights as they cruised through our solar system. After passing the planets, the probes have continued outward towards the farthest reaches of the solar system. In the summer of 2012, Voyager I was now 18.2 billion km away from us, more than three times the distance between the sun and Pluto. The solar system however by definition consists not only of the planets, but of the volume in space to which the sun's particles extend, or in other words the volume in space which is impacted by the sun. The question everybody was asking, was how long would it take Voyager I to leave the solar system and enter interstellar space? And what would Voyager find when it got to interstellar space?

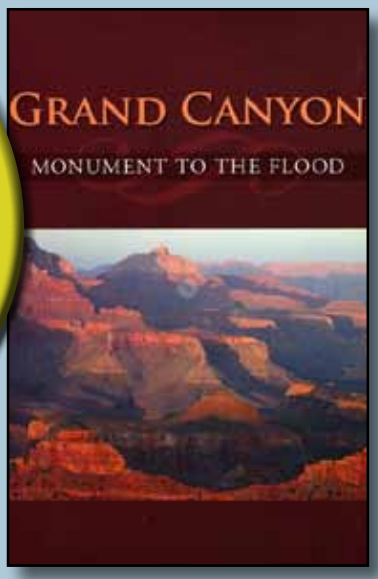
In July and August 2012, Voyager recorded a change in the solar wind (outward flow of charged particles). The speed of motion of the particles fell to zero and at the same time the energy content in the particles increased. Such changes might suggest that Voyager I was now in interstellar space, some scientists declared. However these observations were not what physicists expected to find at the solar system/interstellar space boundary. The drop in speed of the charged particles was "totally and completely unanticipated" (*Nature* May 23/13 p. 427) Scientists also expected that charged particles would come from many directions in space once interstellar space was entered rather than just one direction (as from the sun). However this has not been observed. The magnetic field showed no change in direction. A technical article on these observations (*Nature* September 6/12) concluded that the expectations as to what interstellar space is like, may have to be reassessed: "perhaps necessitating a new theoretical formulation of the interaction of the solar wind with the local interstellar medium." (p. 126)

As late as March 2013, the Voyager project director Edward Stone, contradicted a statement by the American Geophysical Union that Voyager I had left the solar system.

By Margaret Helder

Not long after, on September 12/13, a formal statement was published by mission scientists that Voyager I had indeed left the solar system on August 25/12 as previously suspected. Apparently the probe's instruments revealed that Voyager was now surrounded by charged particles much different from those coming from the sun. On this basis scientists decreed that Voyager I had indeed left the solar system. Scientists' expectation that the direction of the particles should change however still has not been fulfilled and scientists do not know why. Possibly their ideas about interstellar space need major revision. Meanwhile engineers estimate that Voyager I has about six more years of fuel left, plenty of time, we hope, for more exciting observations.

The most difficult thing to open is a closed mind. Let's try!



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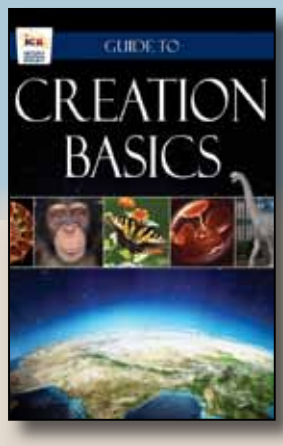

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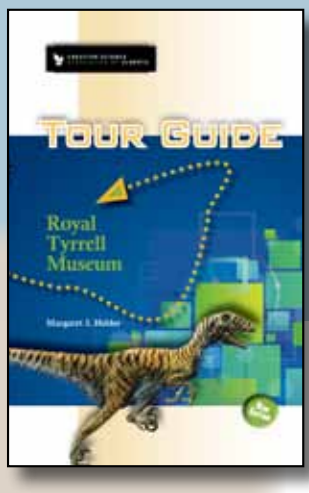

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Margaret Helder

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