Creation Science Dialogue

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In this issue



# Monarch Butterflies
## Special Orienteers!

by Margaret Helder

Every September, hundreds of thousands of Ontario butterflies converge on Point Pelee, a long peninsula which projects south into one of the Great Lakes. Then away they flutter, across the water and far beyond. Thus begins the amazing mass migration of an insect which unerringly navigates 4000 kilometers to a site where these individuals have never been. The Monarch butterfly, it turns out, is an astounding phenomenon.

Spring finds about 100 million Monarch butterflies sunning themselves on huge pine trees in a 150 square kilometer region in the Mexican Sierra Madre mountains. As the days grow longer and warmer, the butterflies which have done little all winter but sit, now start to fly north. Along the way these insects eat newly emerging milkweed plants and lay eggs. The original adults soon die but the next generation emerges and continues the flight north, eating and reproducing as they go. And the next generation does the same thing. At this time of year, the adults live only about a month. Eventually the butterflies reach their summer range in the north central and eastern parts of the United States and in south central and eastern Canada. During the summer the butterflies fly aimlessly about, eating and reproducing for perhaps another two generations. These insects have no interest in traveling anywhere specific. Then all of a sudden as the day length declines to only 12 hours of daylight or less, the newly emerging adult butterflies exhibit a compulsion to fly southwest. They fly about 80 km per day for about two months until they reach the site in Mexico which their remote ancestors left so many months previously. The fall hatched butterflies do not reproduce nor do they die after a month. Rather they sit through the winter, waiting for spring to arrive.

In recent years some interesting details concerning the Monarch's navigation system have emerged. The tiny head of the butterfly makes use of both a clock and a compass to plot the migration route. Even people have a biological clock which they mostly take for granted. How many people wake up at the same time each morning? How many people suffer from jet lag when their biological rhythms are out of synchrony in a new time zone? These effects are produced by a natural internal biological clock. Since Monarch butterflies make such obvious use of a biological clock, this is one of the systems which has been studied. The clock makes use of a daily increase and decline in levels of certain proteins in the tiny butterfly brain.

As daylight arrives, blue light from the sun impacts a light receptor called Cryptochrome (meaning hidden pigment). The light changes the shape of the Cryptochrome 1 in the central complex of the brain (four cells). This protein now has an effect on another protein. It combines with a special protein called Timeless which then begins to decline in amount. At the same time however, Timeless moves into a relationship with Period (also a protein). Period similarly begins to disintegrate but at the same time it moves into a relationship with Cryptochrome 2. It is the latter protein which has

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# Spectacular Anniversary Review

by Margaret Helder

Anniversaries are certainly special. Everyone recognizes that, and a two hundredth anniversary definitely merits plenty of attention. So it is that Fathom Media , in conjunction with Creation Ministries International has produced a spectacular overview on the significance of Darwin's life (born 200 years ago) and of his famous book (published 150 years ago). This 54 minute DVD, filmed with the best technology, combines beautiful scenery shot on location in south America and England, with dramatic re-enactments from Darwin's life. Just released in September 2009, the objective of this DVD is to explain why Darwin's work had so significant an impact on the culture then as well as now, and why that impact is antagonistic to religious faith. This film, which was the brainchild of Dr. Emil Silvestru, on the staff of Creation Ministries International (Canada), begins with scenes from Darwin's childhood and youth. As we progress through Darwin's life with historical re-enactments and wonderful shots on location, the experts provide commentary. Some of these experts are secular, but others are sympathetic to the objectives of the film.

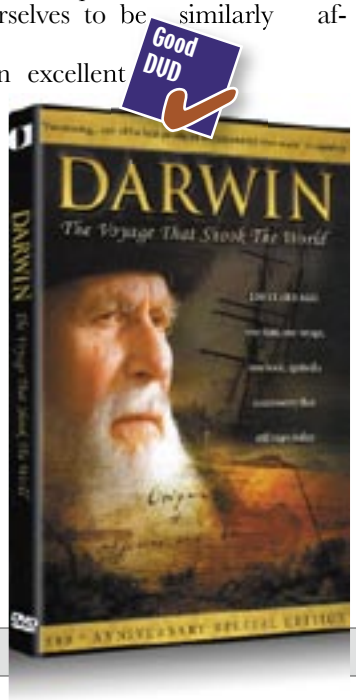
Firstly we hear from science historians: Dr. Janet Browne (British), American Dr. Sandra Herbert and Dr. Peter Bowler of Ireland. As we move into Darwin's voyage on the Beagle, we hear from other experts: geologist Dr. Silvestru, British Dr. Stuart Burgess and famous Canadian dinosaur expert Dr. Philip Currie , formerly of the Royal Tyrrell Museum and presently at University of Alberta. The pace of the scientific discussion picks up as we trace Darwin's progress around Argentina, Tierra del Fuego, Chile and out to the Galapagos Islands in the ocean west of Ecuador. Once at the Galapagos, we hear about biology rather than geology. We hear from Dr. Bryan Milstead, head of research at the Charles Darwin Research Centre, American marine biologist Dr. Bryan Carter and Craig Buckley, Darwin Project Officer from Cambridge University, the institution where Darwin studied. In this discussion we hear about the wildlife on the Galapagos which provide compelling evidence that the islands and their inhabitants are of recent origin.

New experts now come on the scene: American biophysicist Dr. Cornelius Hunter, Dutch ecologist Dr. Jan Komdeur and biochemist Dr. Matti Leisola of Finlalnd, who discuss the development of Darwin's views as he matured. The discussion focuses on how Darwin emphasized the importance of death in his theory and how this affected his life and his health. Last of all, philosophers Dr. Alvin Plantinga (American) and Dr. Tapio Puolimatka from Finland, discuss the relationship of Darwin's views to science and to religion. As Canadian Dr. Philip Currie remarks in this regard: "Darwin was taking philosophy in an anti-religion direction."

This film not only offers visually delightful scenes, acting and illustrations, but also insightful discussion from a varied line up of experts. Young viewers will enjoy the historical details while others will also appreciate the critical analysis of Darwin's observations, the conclusions he drew and his reasons for coming to those conclusions. Lastly most viewers will be interested in the impact of Darwin's views on us today. The question everyone must answer is why society would be so impressed by someone who spent such a short time in each location (five weeks in the Galapagos for example). Each viewer must ask himself whether Darwin's impact has been for good or for ill over these past two centuries. Will we allow ourselves to be similarly affected?

This is an excellent general interest DVD with appeal for the whole family. Let's observe Darwin's centenary the right way!

***Darwin: the Voyage that Shook the World. Fathom Media. 54 minutes $18.00.***



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# Pandas
## *A major problem for Evolution*

by Jerry Bergman

The giant panda, one of the most popular and lovable zoo animals, is in the top ten of animal favourites. Called a super large teddy-bear, the panda has appeared as toys and dolls, on calendars, and thousands of other items. Reasons why it is so popular include its cute baby bear face, its cuddly soft roundness, and its clumsy playfulness. It was called a white bear for years because it has black fur on its legs, ears and around its eyes on an otherwise white body.

Pandas consume about 18 kg (40 pounds) of bamboo a day. Bamboo makes up 99% of their diet but they will occasionally eat meat. Their major enemy is humans, though occasionally snow leopards or wild dogs have been known to eat cubs who have wandered from their mom. Humans have hunted them for their fur and encroached onto their land for decades. Only about 1,000 were left until, in recent years, a systematic effort was made to prevent their extinction due to their popularity and worldwide concern for their fate.Two main pandas exist, the familiar giant panda ( *Ailuropoda melanoleuca)* weighing up to 160 kg and the 3 to 4.5 kg red panda (*Ailurus fulgens*). The giant panda is an enigma to evolutionists because no one has proffered even close to a reasonable idea of what animal it could have evolved from. Indeed, pandas are so different from all other animals that evolutionists have had a hard time even postulating a logical evolutionary origin scenario. One scientist, after studying the panda for many years, concluded that the giant panda evolved from the bear family and the red panda from the raccoon family. Other biologists "looked at the same evidence and came away convinced that the two were relatives, belonging to the same branch on the evolutionary tree" (George Schaller. 1993. *The Last Panda.* University of Chicago Press p. 261).

Evolutionists assume that, because humans appear to have shared certain features in common with apes and gorillas, this is evidence that they have descended from a common ancestor. In contrast, many animals often have similar features, yet evolutionists do not believe they could be derived from a common ancestor. An example of two animals with some similar features, yet which are different enough that evolutionists do not believe they could be derived from a common ancestor, is the case of the giant and red pandas. They differ in that the giant panda looks much like a medium sized bear. The red panda looks like a red raccoon and is about the same size, has a long striped tail, but it also has a bear like face, and other bear like features (Ramona and Desmond Morris. 1966. *Men and Pandas,* McGraw-Hill pp. 18-19).

The red and giant pandas also share many traits. Both have enlarged sesamoid [a bone developing within a tendon] thumbs (or slightly enlarged carpal/wrist bones) that in the case of the giant panda, function as opposable thumbs to help them grip bamboo so as to strip off its leaves, their main diet (Michael Salesa. 2006. *Proceedings of the National Academy of Sciences* 103 (2): p. 397). This feature is one reason why they are both labeled pandas. Nevertheless evolutionists do not believe these animals have a close evolutionary relationship because of the many major differences between them.

The skull, teeth and forepaws of both the red and giant pandas are all designed to help them consume bamboo, but only the giant panda can use its radial sesamoid as an opposable thumb (Schaller p. 261). Though the red panda's radial sesamoid is not as pronounced as that of the giant panda, recent research suggests that the red panda can use them like an opposable thumb, but in a very different way than that of the giant panda (Hideki Endo *et al.* 2005. *Annals of Anatomy* 183 (2): 181-184.) The problem is, although they "are not closely related, their sharing of this adaptation implies a remarkable convergence" (Salesa p. 397).

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# Three Cheers for Long-Necked Beauties

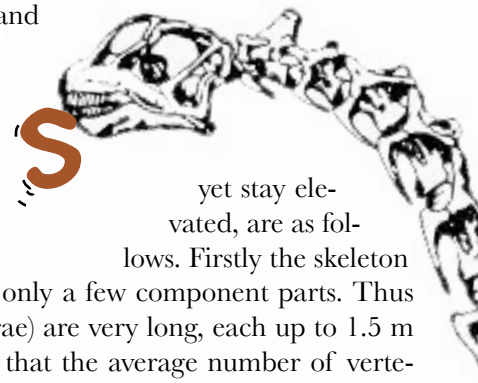
by Moxie

We don't often think that extinct animals might have been examples of wonderful design, but they were! Even if we did reflect on extinct animals which were particularly well designed, we probably would not choose sauropod dinosaurs for that special category. Sauropod dinosaurs, you may remember, were the large plodding, four-footed specimens with long necks and long tails. They were probably the largest animals ever to have lived on land. They all grazed on plants. This was no doubt a good thing, since they probably were too slow to catch anything. So, you may well ask, what could be so special about these awkward looking creatures? Plenty!

The most amazing aspect of these creatures was their long necks, which reached truly amazing proportions. *Camarasaurus,* for example, which was a relatively small sauropod at 18 m (55 ft) long, had a neck about 2.7 m (8 ft) long balanced by a tail about 8 m or 25 ft long. *Apatosaurus* (famous for its original name of *Brontosaurus,* before it had the correct head attached to the rest of the skeleton), measured about 21 m (65 ft) long of which its neck was 4.5 m (15 ft) and its tail 7 m (24 ft). Then there was *Mamenchisaurus* with perhaps the longest neck of all. With its whole body length of 25 m (80 ft), it boasted a neck length of up to 14 m (46 ft), balanced by a tail which was even a little longer. The tails, of course, could drape downward without compromising the lifestyle of the animal, but the head would have to be held up in the air, supported by a horizontal or somewhat vertical neck. Therein lay some serious engineering challenges for these dinosaurs. It is not so easy to hold a long neck up in the air.

The problems of a long neck are as follows. Imagine for example that you have a vertical piece of wood. You want to attach a horizontal beam to the vertical structure. So, of course, you use lots of nails or screws to secure the second piece of wood at right angles to the vertical one so that you have a rigid board projecting from the vertical beam. Now suppose however that instead of a rigid board, you attach a string of wooden beads to the vertical structure. Do these beads stretch out horizontally the way the rigid beam did? Of course not, the beads hang down. Similar engineering principles apply to long dinosaur necks. A rigid piece of bone would keep the neck elevated in the air, but of course (being rigid), it could not move. Alternatively, if the skeleton in the neck consists of separate bones, it would hang down, unless some cleverly engineered modifications are applied.

The design solutions which allow the long dinosaur necks to move, and yet stay elevated, are as follows. Firstly the skeleton in the neck consists of only a few component parts. Thus the neck bones (vertebrae) are very long, each up to 1.5 m (5 ft) long. This means that the average number of vertebrae (bones) in a sauropod neck is only about 12, while the average number of tail vertebrae might have been as high as 80. The lower number of component parts meant that less extra support was needed to keep the neck in the air.



Secondly the neck bones were exceptionally light but strong. Apparently the sauropod neck vertebrae were like those strong silvery helium balloons that we buy for cel-

ebrations. They had a very thin but strong layer of bone filled up by sacks of air kept under pressure from the lungs. It is easier to hold up a lighter structure than a heavier one and it certainly takes less energy to do so. The neck however would still hang limply if the component parts were not braced (provided with extra support). This is the third design feature. The beauty of bracing is that it allows for some support and some flexibility at the same time.

If you feel along your backbone, you will find small bumps marking the location of each vertebrae (back bone unit). These projections or spurs extend outward, but not very far in your case. In the case of some dinosaurs however, prominent spurs extended outward from each vertebra (imagine really big bumps along your back bone!) In the case of these dinosaurs, powerful ligaments connected the spurs together, thereby giving the whole backbone good support. This enabled any dinosaur with such a neck to enjoy considerable flexibility in the neck region along with adequate support to keep the head lifted upward. While such a neck was highly mobile however, the animal would have to work a little harder to keep its neck from wobbling. In addition, the bone spurs meant more weight to the neck, so these animals tended to have just moderately long necks. An example of such a dinosaur is *Apatosaurus,* formerly known as *Brontosaurus.*

The really long necks were braced on the other side of the backbone (in toward the internal organs). The bracing took the form of long thin pointy structures (called cervical ribs) which extended from one vertebra under several others in a row, thereby giving strength to the whole thing. These backbones tended to be very light, so extremely long necks were possible. The flexibility was not as great as for the other bracing design, but the neck was easier to keep from wobbling. Examples of such dinosaurs include *Brachiosaurus, Camarasaurus* and *Mamenchisaurus. Diplodocus*, on the other hand, is an example of a dinosaur whose neck was braced in both directions.

Thus we can see that the long necked style of dinosaur required some very special design features. Indeed some dinosaur experts have pointed this out. The *Encyclopedia of Dinosaurs,* edited by Philip Currie and Kevin Padian (1997) declares that the neck bracing provides "maximum strength for minimum weight – a true triumph of engineering." (p. 654). Also Zdenek Spinar and Philip Currie tell us that the air filled neck vertebrae are "marvelously engineered structures for lightness and strength." (in *The Great Dinosaurs* 1994). How very interesting these statements are. Everyone knows that engineered structures require an engineer, an intelligent individual who plans a structure for a particular purpose. In like fashion, engineered dinosaur necks have indeed been designed to solve several problems in managing these lengthy structures.

Of course the sauropod dinosaurs are now extinct and we are probably just as happy that this is so. They were however, wonderfully designed for their life style before the great flood. Apparently those that survived on the ark, have since been unable to cope with new conditions in order to survive to the present. We can still nevertheless appreciate how these creatures contributed to the richness and variety of the creation when they roamed the earth.

# Monarch Butterflies
## Special Orienteers!

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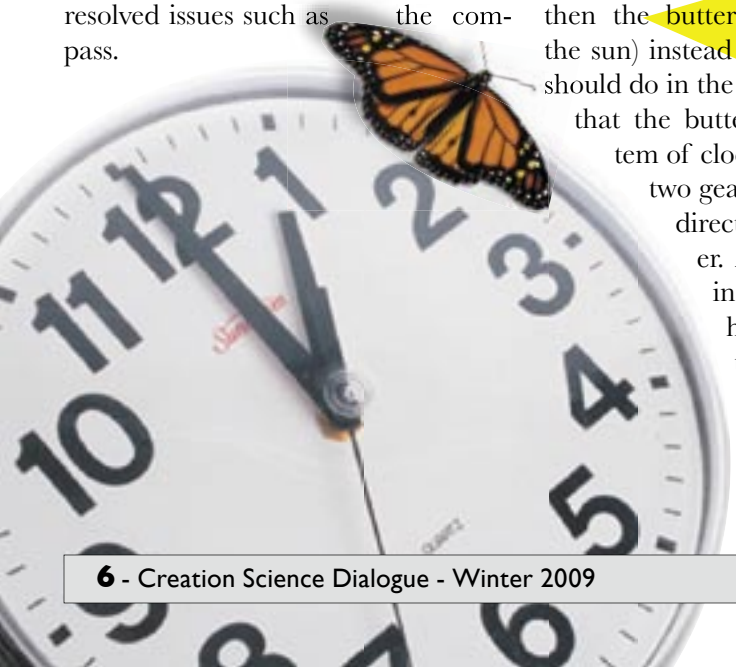
The really important effects. It moves into the nucleus of each of these cells and effectively stops production of the clock proteins which are called Clock/Cycle. As these Clock/Cycle proteins decline in amount through the day, the cell takes note of the passage of time. Cryptochrome 2 however has another extremely important effect. It tells the compass what time it is judging by the amount of Clock/Cycle proteins that are left.

As night falls Cryptochrome 1 stops kicking Timeless/Period/Cryptochrome 2, and Cryptochrome 2 then moves out of the nucleus of these brain cells. During the darkness, Clock and Cycle proteins are synthesized, increasing to maximum amounts by daybreak. Also the Timeless and Period and Cryptochrome 2 proteins are synthesized at night. The system goes round and round and it is the arrival of first light in the morning which keeps the clock synchronized with the actual day/night cycle. So scientists have some understanding of part of the butterfly's navigational system. However there are plenty of other unresolved issues such as the compass.



In order to navigate, of course, one must be able to plot one's route. The first part of the butterfly's compass is special cells on the upper rim of each eye. These cells are sensitive to ultra violet light. It is the sensing of these invisible rays coming from the sun, which enable the butterfly to calculate its position relative to the position of the sun in the sky. The butterfly then flies consistently southwest, day after day, week after week to its destination 4000 km away. The butterfly knows where the southwest is, based on the sun's position in the sky. But of course the sun is constantly changing its position, as it moves from east to west across the sky. This is where the biological clock becomes important. It tells the compass what time it is so that the butterfly can constantly adjust its angle of flight compared to the sun's position .

Studies with butterfly flight patterns show that the butterflies fly obliquely away from the sun (towards the SW) in the morning when the sun is in the east, and obliquely toward the sun (towards the SW) in the afternoon when the sun is in the west. If the butterfly's schedule is artificially manipulated so that it thinks 7 a.m. is actually 1 p.m., then the butterfly flies SE (towards the sun) instead of away from it as it should do in the morning. It is evident that the butterfly's navigation system of clock and compass is like two gears moving in opposite directions against each other. A new study released in September 2009 however suggests that the biological clock, which interacts with the compass, is actually located in the butterfly antennae. So the insect must have two clocks!

Another topic that interests biologists about these insects, is the degree to which the navigational system is unique. The short answer is extremely unusual! A news item in Medical News Today (January 9/08) declared that scientists were "stunned and elated" to discover how unusual the Monarch butterfly biological clock is. Previous studies on the fruit fly and mouse had led scientists to suspect that the Monarch's system would resemble that of the fruitfly (another insect). What they found however was a "novel molecular mechanism heretofore not found in any other insect or mammal" according to Medical News Today). As the authors of the study report: "The expression of two functionally distinct crys [Cryptochromes] in monarchs suggests that the butterfly clock may use a novel clockwork mechanism that is not yet fully described in any organism." (Haisan Zhu et al. PLoS Biology 6 (1): p 3 of 30).

Thus the Monarch's biological clock seems to be unique among insects and all studied organisms. Scientists who might try to find evolutionary sources for this system will have a difficult time. There are no obvious lines of descent from similar organisms. And of course biologists have not even begun to figure out how the compass works. No doubt the uniquely designed status of the Monarch will become even more apparent as the workings of the compass are uncovered.

As we look about us at even small organisms in nature like the Monarch butterfly, let us reflect on the exquisite design of these delightful organisms. Let us then ascribe praise to the Creator of all things.

# Pandas
## *A major problem for Evolution*

***Continued from page 3***

The "independent evolution" of both pandas is very difficult to explain and document.

The panda was historically considered as just another type of bear because its external appearance is superficially very similar to a bear (Morris and Morris p. 183). Schaller wrote: "Is the giant panda a bear? Are the red and giant pandas closely related? These two questions have been debated for over a century. Anatomists, behaviorists, paleontologists, and molecular biologists have led the fascinating inquiry into the evolutionary relationships of these species with ingenuity and persistence, yet they continue to derive different conclusions on the basis of different evidence, and they still pursue the elusive answers." (Schaller 1993 p. 261).

The raccoon school concluded that the giant panda and the red panda both evolved from the raccoon family Procyonidae, and the bear school concludes that they both evolved from a true bear and are members of the family Ursidae (Morris and Morris p. 182). For several decades researchers have moved back and forth between these two views. Professor Peacock's solution to their evolution was to put the giant panda in the bear family, and the red panda in the raccoon family. (Dr. Peacock is a polar bear and panda biologist working for the Canadian Government.) This view caught on, but much controversy still exists. The giant panda is now believed to have descended from bears and the red panda from the raccoon, which is currently placed in its own family, the Ailuridae.

Researchers from the US National Cancer Institute and the National Zoo analyzed genes and proteins from pandas, raccoons, and bears. They concluded that the red panda is *not* as closely related to the raccoon as it looks, but the giant panda is *closer* to a bear than most biologists thought (Hammond, 1985).

Yet enormous differences exist between a giant panda and bears. No evidence exists that either the red or the giant panda can hybridize with any bear species. Bears walk flat on their hind feet, pandas walk on their hind feet toes. Bears have long claws useful for digging, while pandas have a modified sesamoid bone that functions as a thumb. Most bear species have 74 chromosomes, pandas only 42. The panda's digestive system is much shorter than that of bears, so short it can digest only about 20% of its food compared to 60% for most herbivores. To obtain sufficient calories it must consume 12 to 15% of its body weight in food daily, requiring it to eat for 15 hours each day of its adult life.

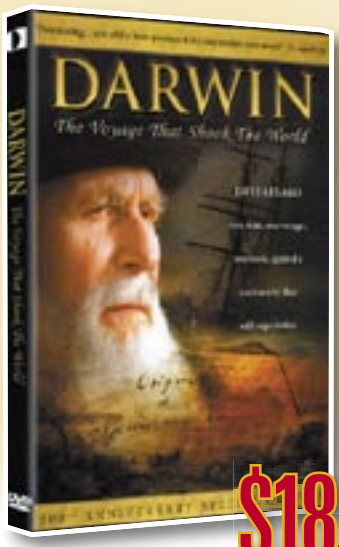
An excellent panda fossil record exists over a wide area, from Burma to Szechuan China. So far, no fossils have been located that link the panda to any theoretical evolutionary ancestors. The earliest known panda fossils (Pleistocene), appear to be fully modern pandas. Some argue that the reason little change is seen in the fossil record is because the only very early evidence of pandas so far includes isolated teeth, lower jaws, and a few skulls (C. Jin *et al. 2007. Proceedings of the National Academy of Sciences* 103 (2): p. 10932). Only an extinct, supposedly the "pygmy" version of the giant panda known as *Ailuropoda microta*, has ever been found in the fossil record.

This evidence, though, is enough for zoologists to conclude that the panda "has not changed its appearance since the Pleistocene" (I. Poglayen-Neuwall 1975. *Grzimek's Animal Life Encyclopedia.* Van Nostrand Reinhold vol. 12 p.112). The major difference is fossils of the earliest giant pandas discovered indicate that it was about half the size of the modern giant pandas. Their feeding behaviour, though, judging by the skull and teeth, was centered on bamboo as is true today. There is not much to cheer about when it comes to ideas about panda evolution, is there?

## Darwin: the Voyage that Shook the World

***Fathom Media***

This new first class DVD examines what Darwin's impact on our culture has been and why this is so. It also demonstrates that the evidence that Darwin saw, did not support his conclusions. What a way to observe this man's 200th anniversary. Fun for the whole family! / *54 minutes*

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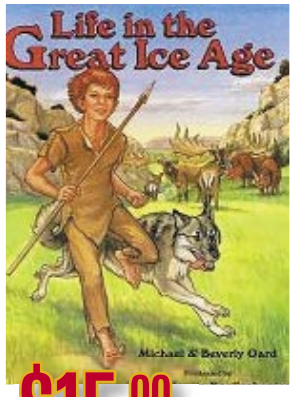


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## Tour Guide: Royal Tyrrell Museum

***Margaret Helder***

Alberta's dinosaurs are fabulous and fun, and the museum has repackaged its displays to communicate this. Consequently new descriptions and discussions were needed for this guide. There is more commentary on the significance of the displays so the guide is more user friendly than ever. / *Paper (coil)/56 pages*
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