Creation Science
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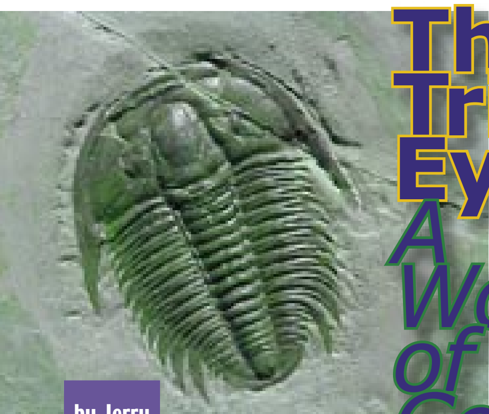
In this issue



Some of the first preserved fossils were trilobites. Most paleontologists thus consider trilobites to be one of the most ancient of known fossil groups. Fortunately, a large number of well-preserved examples exist, which al-



## The Trilobite Eye
## *A Wonder of Complex Design*

by Jerry Bergman

lows a detailed study of the animal. As a result, much is known about its well-designed, complex eye. New research on the workings of the trilobite eye shows that it is far more complex and better designed than thought even just a few years ago. Such a discovery is contrary to evolution theory.

Trilobita is a large class of extinct marine bottom-dwelling arthropods (a group including insects, spiders and crustaceans like lobsters) that were abundant in the Cambrian and Silurian seas. Fossilized trilobites are commonly found in many parts of the world. The large number of well-preserved examples has allowed detailed studies of the animal's anatomy. They possessed the first known "compound" (multi-lensed) design type of eye (specifically the diopter apparatus) that preserves very well in the fossil record. The once misnamed "simple primitive" trilobite eye is now known to incorporate an incredibly complex optical-chemical system into its design. Marine biologist Richard Ellis called the "compound eyes of trilobite … with their hundreds of lenses… far more complicated than the eyes of any vertebrates" (2001, p. 7). Scientists claim that the trilobite not only had: "highly organized visual organs, but some of the recently discovered properties of trilobites' eye lenses represent an all-time feat of function optimization … a very successful scheme of eye structure: the composite or compound eye." (Levi-Setti, 1993, p. 29).

The trilobite eye is the "oldest eye of which we have record" (Sinclair, 1985, p. 9). Trilobites lived, by evolutionist reckoning, over 500 million years ago. Duke-Elder wrote a half-century ago that a major problem for vision evolution is that "among the earliest fossils known to man – the Trilobites, Arthropods which crept over the sea-bed … both median ocelli [simple eye]and lateral compound

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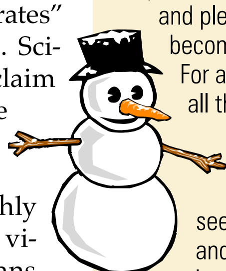

## Chilly Fun Outdoors

by Moxie

Some people are tempted to stay inside when the weather gets cold. That, of course, is neither me nor you! We know that there is plenty to do, and plenty to learn, when the weather becomes cool and even downright chilly. For a start in the fall, we can look for all the ways that plants and animals prepare for winter. The weeds, for the most part, have all produced seed. Have you noticed the thistle seeds, light as down, that blow away and lodge in all sorts of new locations, there to germinate in the spring.

Fireweed seeds and goldenrod seeds also make use of dispersal (spread) of their seeds by the wind. Some other plants simply produce heavy seeds that fall down near the parent plant. Should that patch of soil be covered up with other vegetation in the spring, those heavy seeds can wait years until the soil is disturbed again. In any case, most seeds produced in nature, require several weeks of extreme cold before they will germinate. This prevents the seeds from producing tender young seedlings just before winter arrives. Otherwise these new plants would freeze and die.
Some plants elect to survive the winter by shedding their leaves. The plant forms a tough zone at the base of each leaf. The leaf falls off and a leaf scar, a mark where the leaf previously was attached, remains on the stem. If the plant did not form that tough (abscission) layer, the plant could die from loss of water or from allowing insects an easy access into the stem. See if you can find leaf scars on the twigs of trees and bushes near your place. Above each leaf scar, often the plant has produced a bud which protects next year's growing shoot. The bud is protected by hardened scales. Only when the plant has endured weeks of extreme cold, and when suitable conditions return, will the plant

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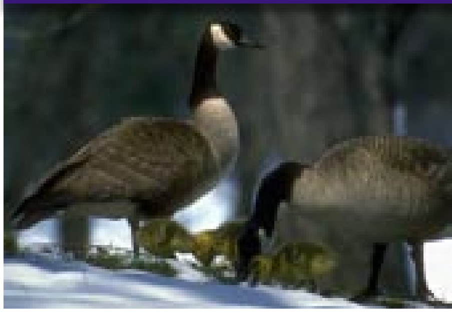
# Chilly Fun Outdoors cont. from cover



break out the new growth from its buds. It can be very difficult for horticulturists to artificially persuade some plants to bud out. The plants however know how and when to do it.

Then again other plants elect to die down to the ground and to spend the winter simply as buried roots with attached buried buds. Some plants, like thistles and dandelions, have very deep tap roots. It might be fun sometime to try to dig out a thistle root. It is said that they can penetrate down perhaps 2 metres into the soil. This can explain the extreme difficulty people have in eliminating these plants from their property. It is certainly fun in the spring to see perennials begin to push up new shoots.

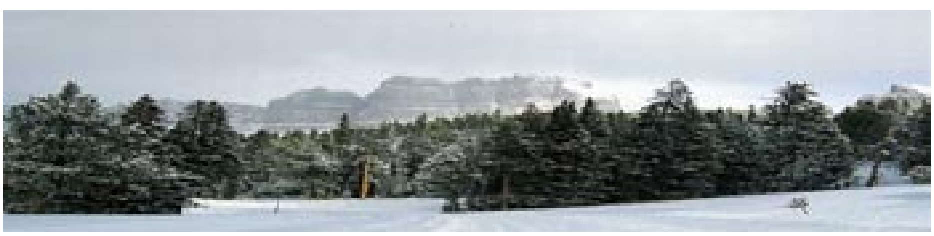
The most daring plants of all are the evergreens, mostly the conifers like spruce and fir and pine. These plants have narrow leaves (needles) with very thick resistant surfaces. These thick leaf surfaces are necessary to keep these plants from drying out during the winter when the sun shines on them, the wind blows, but no water can be obtained from the soil since everything is frozen solid. The cold air of winter can be extremely drying for many evergreen plants. The tamarack is a similar plant that sheds its needles in the fall. There are broad leaf evergreen plants too, such as bearberry (*Arctostaphylos*) and wintergreen (*Pyrola*). These plants are small, hugging the ground, so that they will generally be covered up by snow. In that location they should not dry out too much.

There are obviously many strategies that plants can adopt to survive the winter. The main thing is that the plant has a survival strategy to follow. Plants brought into Alberta from warmer climates will not survive the winter although they may be technically perennials elsewhere. They will not survive because they are not prepared for the cold. Animals too have a variety of options available for surviving the chill of winter. The rich variety of strategies which animals have is a further indication of how interesting the creation is.

For a start, of course, we think of migration. Some creatures migrate for astonishing distances and show amazing talents for precise navigation. We think of the monarch butterfly and of various migratory birds. On three occasions in late September, my husband and I have observed sandhill cranes (astonishingly large birds!) in fields east of Sault Ste Marie in Ontario. These birds are not there earlier in the season, but only when they proceed from points farther north, to points farther south. We saw the skies over Saskatchewan covered with huge lacy arrangements of thousands of geese (perhaps snow geese) wending their ways south. Smaller birds in their vast variety including robins, sparrows, warblers, hummingbirds and nuthatches among others, all increase in numbers in city backyards as they proceed from the north, and as they catch up with stragglers which have not yet left.

Some animals however elect to stay throughout the winter. Such animals must either be able to find a suitable supply of food through the winter (such as deer and moose and rabbits that can eat twigs, bark of trees and dead vegetation and lichens). Some animals, like squirrels, set up storehouses of food for themselves. The beaver, of course, is the most exciting of these animals. He not only stores food for the winter, but he also builds himself a lodge in which to keep warm and safe, with easy access to the food. Some creatures like bears elect to hibernate. They eat lots during the summer and then lower their metabolism drastically in the winter so that they need neither food nor drink. Other creatures like some insects and some pond creatures, retreat to the cool depths of bodies of water like ponds. For some of them only the eggs survive the winter.

It is evident that the wonders of creation include more than showy appearances or strange environments. The every day details that enable organisms to thrive in cold parts of the globe are indeed wonderful design features for which we should be very thankful. A landscape without plants and animals would be a dreary place indeed. There are no doubt plenty of other strategies, why not use your observations skills to discover some of these. You could then research further details about these organisms. Consider it a challenge that you can't resist!

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# Out and About in Alberta

The summer of 2007 started with a bang when the Big Valley Creation Science Museum officially opened its doors. It took four years for Harry Nibourg's dream to become reality. The dedicated efforts of many skilled volunteers such as Vance Nelson (of Creation Truth Ministries) and Ian Juby (of Canada's first traveling creation science museum) led to this event which received front page coverage in major newspapers across Canada. Many people, both supporters and skeptics, have already visited this facility on the main street of Big Valley, 60 km north of Drumheller or 40 km south of Stettler.

During October 2007, Ray Strom of Calgary addressed the Creation Science Association of Alberta on the topic "Conflict and Progress—Creation Moves Ahead." Among other topics, he discussed his participation in the Institute for Creation Research's FAST (Flood Activated Sedimentation and Tectonics) project. As a participant on one of the research teams, Mr. Strom provided an overview of research into the nature of cross bedded sandstone such as the Coconino sandstone of the Grand Canyon. By means of comparisons on the characteristics of modern sand dunes with the characteristics of the cross bedded rocks, the ICR team is finding that the cross bedded rocks, in many geological formations, were actually deposited under water. They also hope to study some modern examples of sand waves formed under energetic water currents. Such studies will contribute to an understanding of how rocks with various characteristics (such as cross bedding) were quickly laid down during the Flood.

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Looking for a family friendly film that gets you thinking? Look no further than *Life's Story 2: The Reason for the Journey*. Brought to us by the makers of the popular "*Incredible Creatures that Defy Evolution*" series, Life's Story 2 has much to offer.

You will not be disappointed by the beautiful photography that captures the intricate design of a wide variety of fish, birds and animals. Visit the Sinai Peninsula in Eygpt and take a tour through the coral reefs. As you swim along the North African coast, watch and wonder at the extraordinary marine creatures. Explore the wildlife of the African plains: zebras, elephants, giraffes and many, many more.

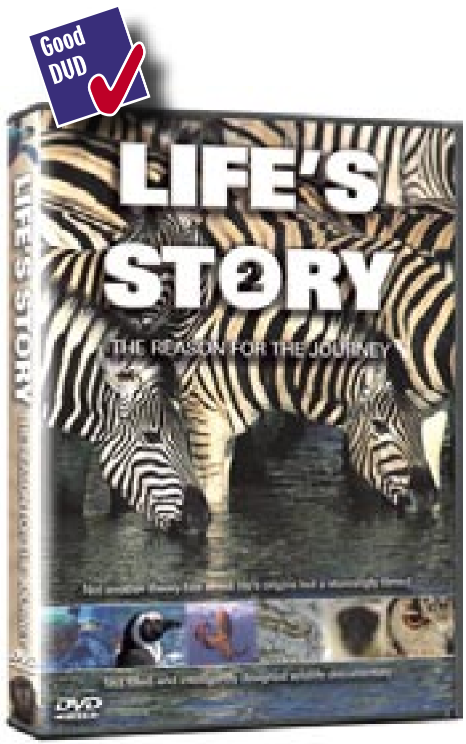
While this visual extravaganza plays before your eyes, enjoy the classical music that compliments the photography and the verbal commentary that looks at these creatures from an intelligent design and creationist perspective. Use this film in a classroom or small group setting to start a discussion on these topics.

Divided into two 45 minutes sections, Life's Story 2 is really two films in one which makes it very user friendly.

On the case the producers suggest that this film is suitable for ages 10 through adult. Nevertheless, the whole family will enjoy this film. Certainly young children will not understand the "talking" component, nevertheless people of all ages will enjoy the close up encounters with the unusual and wonderful wildlife that you will witness when you watch Life's Story 2.

*Life's Story 2: The Reason for the Journey*
DVD. 100 minutes. Exploration Films. $18.00

**Reviewed by Tina Bain**



# The Trilobite Eye
## *A Wonder of Complex Design*

*continued from page 1*

**by Jerry Bergman**

Eyes were present which have reached a high stage of complexity " (1958, pp. 156-157). Trilobite scientists now conclude that trilobites "possessed the most sophisticated eye lenses ever produced," and their vision may actually have "been superior to current living animals" (Shawver, 1974, p. 72). Based on careful examination of fossils, researchers have concluded that trilobites could see exceptionally well, even though they often lived in the deep (thus very dark) sea bottom. One reason why is that their eye lenses were designed specifically to function in low-light, watery environments.

A compound eye is constructed from a large array of separate eye optical elements called ommatidia. Each eye component (ommatidium) was pointed in a different direction, allowing the trilobite to simultaneously see in front, on each side, and behind it, giving it a panoramic view of the world (Fortey, 2004, p. 449). A network of photoreceptors and neurons then translated the many optical images picked up by the compound eye into a single composite picture. Evidence of the effectiveness of this eye design is the fact that it is still widely used on both insects and crustaceans today (Levi-Setti, 1993, p. 29).

One example of the excellent trilobite design was the eye lens used on each ommatidium (Fernald, 1997; 2001). The corneal lens faced the outside world. It was constructed of clear calcite crystals, a hard mineral with very unique optical properties, well suited for underwater vision. The calcite lens also makes trilobites unique in the entire animal kingdom (Fortey, 2000, p. 92). Most eye lenses are the "soft" type constructed out of cuticle. The trilobite calcite lens design used two separate layers called a doublet, each with different optical properties that functioned together as a unit to focus the image.

Trilobite eyes were usually hexagonally shaped, but some used square elongated clear calcite prisms (Fortey, 2000, p. 96). The result was a design that had a huge advantage in low light, even compared to most modern eyes. The lens used a design that largely eliminated the spherical aberration problem, the distortion caused by the lens shape (Fortey, 2004, p. 449). Spherical distortion occurs when the image is less sharp and slightly distorted, especially at the lens periphery compared to the centre of the lens. Levi-Setti wrote that: "This optical doublet is a device so typically associated with human invention that its discovery in trilobites comes as something of a shock. The realization that trilobites developed and used such devices half a billion years ago makes the shock even greater. And a final discovery – that the refracting interface between the two lens elements in a trilobite's eye was designed in accordance with optical constructions worked out by Descartes and Huygens in the mid-seventeenth century – borders on sheer science fiction" (1993, p. 54).

A large amount of variety exists in the eye design of the estimated 200 different trilobite species. Research has found that specific trilobite eye design varied according to the light environment in which the trilobite lived (Clarkson, 1975). Some trilobites had eyes with a few lenses; other types had eyes with lenses numbering in the thousands. Some eyes were enormous, taking up most of the surface of the head. The most common eye design was a turret shape that produced a combined visual field that covered the animal's entire surroundings (Levi-Setti, 1993, p. 32). Three basic designs exist: the *holochroal*, the *schizochroal*, and the *abathochroal*.

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The *holochroal* variety was both the most common trilobite eye type and also the most complex. This design consisted of thousands of small hexagonal-shaped lenses that function together as a unit. Each lens used a shelled, biconvex design consisting of a thin calcite layer covered by a thin protective film. This design is found in all trilobite orders and in many different species. Trilobites in sediments above the Cambrian had thicker lenses.

The second trilobite eye type, the aggregate or *schizochroal* eye, was similar to the holochroal type except that it had fewer and larger biconvex lenses that were set in a turret-like arrangement separated by a hard fibrous membrane. This "highly sophisticated" eye design is found only in the trilobite order Phacopida, and is a "visual system quite different from any other eye that has ever appeared in the animal kingdom" (Fortey, 2004, 449; Levi-Setti, 1993, p. 43). The juvenile holochroal eye resembled a schizochroal eye, and Darwinists believe that it represented the retaining of ancestral juvenile characteristics into adulthood (Clarkson, 1975). This eye type appeared fully formed in the fossil record at higher levels of Cambrian rock.

The last basic trilobite eye type, the *abathochroal* form, resembles a schizochroal eye, except that it does not have membranes between each individual lens. This design is found in only a few types of Cambrian trilobites.

Some eyeless trilobite species also existed, all of which lived in the darkness of the deep sea floor below the sunlit zone (Fortey, 2004, p. 449). Instead of labeling these trilobites more primitive than sighted trilobites, and because lobsters and other crustaceans that lived on the deep sea floor were eyeless, evolutionists speculate that the eyes of these trilobites were slowly lost during evolution. The Darwinist's explanation of the origin of the trilobite eye is that: "Through natural selection operating on chance variations – trilobites evolved a remarkably sophisticated optical system. For an optical engineer to develop such a system would require considerable knowledge of such things as Fermat's principle, Abbe's sine law, Shell's laws of refractions, the optics of birefringent crystals, and quite a bit of ingenuity" (Stanley and Raup, 1978, p. 182).

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Although trilobite eyes are well preserved and abundant in the fossil record, no evidence exists of their evolution. They appear fully formed in the fossil record. Levi-Setti concluded the external similarities of the "primitive" trilobite eye "to those of some modern insects (for example, the ant) is quite remarkable" (1993, p. 34). This man wrote that the schizochroal eye "probably evolved from the holochroal eye," but this conclusion is based solely on comparisons of outward appearance, not fossil evidence of transitional forms.

The trilobite eye is the earliest known eye existing in the fossil record, yet it is extremely well designed. It is not a primitive eye in any way, but a highly advanced and highly effective eye, especially given the trilobites' typical environment at the bottom of deep water that is normally close to completely dark. As Shawver wrote, trilobite eyes are an "impressive feat of early evolution," but even though trilobites were the most prevalent animal in the Cambrian Sea, no evidence of trilobite eye evolution exists – in spite of an abundant fossil record dating back to the early Cambrian (1974, pp. 72-73). Lack of empirical evidence has forced scientists to speculate on the path of trilobite eye evolution and, for this reason, historically, "views on eye evolution have flip-flopped, alternately favoring one or many origins" Fernald, 2006, p. 1917).

The most that scientists can now say is we "have some understanding of how eyes *might* have evolved" Fernald, 2004 p. 141 emphasis mine). As Levi-Setti concluded, the "real surprise" is not that the eyes functioned according to the laws of physics, but that their "basic lens designs" were engineered "with such ingenuity" (1993, p. 54). This evidence contradicts Darwin's prediction that the earliest eyes were primitive, and that a large number of transitional forms, suggestive of eye evolution from simple to complex, would be found in the fossil record (1859). This is certainly food for thought!

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# *Almost* Impossible Challenge

by Margaret Helder

Some people like a good challenge and some don't. Some people like the challenge of climbing Mount Everest, while others would prefer to stay home. Such people might point out that there are some challenges which are best ignored. There could well be challenges which are just too difficult or time consuming to undertake. For example, in August a team from Cambridge University reported that it took them twenty two years to produce a synthetic version of azadirachtin, a product which India's neem tree (*Azadirachta indica*) effortlessly produces in large quantities.

There are a number of reasons why synthetic chemistry is sometimes hard pressed to reproduce natural products. The synthesis of azadirachtin required 64 steps. Much of the time was spent figuring out what the next step should be, one presumes, and how to bring about the appropriate transformation in what they already had. Some chemists criticized the English team for pursuing this project for so long. Many chemists today recognize that it is impossible, or nearly so, to duplicate some natural products. It seems strange however that scientists who so confidently claim that they will create life in a test tube within the next few years, nevertheless cannot duplicate some of the products of living cells. There is an obvious disconnect here. Can it be that technological man lacks many of the skills programmed into numerous organisms such as microbes or even like the neem tree?

The problem which the English chemists faced was that they lack many of the skills and the tools which living cells use to produce natural products. For a start, living cells are particular about what compounds they produce. All organic compounds are carbon based, that is the molecules are built around a core of carbon. The possible number and arrangement of additions to this core are infinite as far as the synthetic chemist is concerned. Computers can design compounds which differ endlessly in small details. Living cells however are far more particular. They produce only a few products (thousands compared to infinity) and many of these are much more unusual in their design that the computer generated products. Computers after all are not ingenious or original, but it seems that living cells (or at least the designer of living cells) is/are highly original. Thus even the huge libraries of synthetic compounds available to chemists, may not reflect the "rich chemical diversity of the much smaller numbers of natural products."

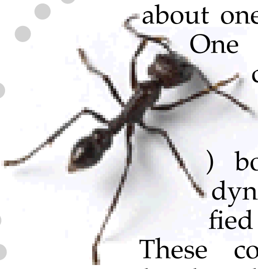
(Christopher M. Dobson. *Nature* Dec. 16, 2004 p. 826)

Obviously chemists start out at a disadvantage when they undertake to duplicate in the laboratory a synthesis which is naturally carried out by a living organism. The disadvantages to the chemists are compounded by the fact that natural products tend to be much larger and more complicated than compounds designed in the laboratory. Natural products tend to have centres in their structure that allow for twisting so that the molecule can assume alternate shapes. This is not true of synthetic molecules. Also the arrangement of elements in natural products often produces elaborate, not easily described shapes (compared to the basic geometry in a chemist's designed products.) In addition, somehow and unexpectedly, the large natural products have greater solubility in water than synthetic designs.

Just as the end results of living processes in the cell are fancier than synthetic products, so too, the processes for producing natural products are much more sophisticated than in the laboratory. Most cells, for a start, package information controlling the manufacture of assembly line machinery (in the form of certain proteins) next to information which ensures that the appropriate raw products are produced at the appropriate time and in suitable amounts ( like an ideal factory). So the assembly line receives what it needs when it needs it. One interesting thing is that the raw products in cells are simple organic molecules in common use in the cell. Lastly a third cluster of information

brings about unusual modifications or tailoring, to intermediate and final steps. It is the unusual modifications to the final product which make the compound biologically active (able to carry out its designated task).

The living cell has the ability to build into a molecule the capacity to change quickly into a desired active form. For example, some products called enediynes have been isolated from certain microbes. These compounds include some of the most potent toxins known. For example, the concentration required to kill 50% of victims is so low that it works out to about one molecule per cell!



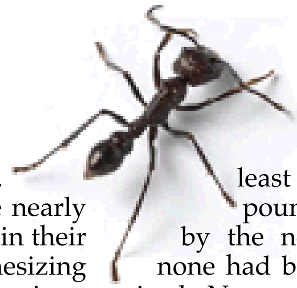
One of these products, calicheamicin, has an unusual triple sulphur (-S-S-S-) bond. Another one, dynemicin has a modified benzene like ring. These components of the molecules, allow for a rapid cascade of change when conditions in the cell are appropriate. This sequence of events results in molecules which are able to aggressively oxidize things like DNA. The genetic information breaks up and the cell dies.

Such chemical changes to a stored, seemingly innocent compound, show the finesse of organisms in producing fancy molecules. The process may require 20-40 steps to complete, including final processing, but 50 or more steps are not uncommon. Such lengthy manufacturing processes with unusual intermediate steps, indicate that these manufacturing procedures are not the result of randomly accumulating know how. The cells use assembly lines which are dedicated to the final product. The chemical steps in between are relevant to the cell only in that they represent stepping stones to the final product. There is no biological process, such as evolution, which could preserve a partly developed manufacturing process. What would be the point of conserving a product that does nothing? These metabolic pathways are clearly designed.

Chemists are not anywhere nearly as sophisticated as living cells in their approach to artificially synthesizing natural products. Whereas organisms carry out late-stage modifications to the reactivity of these molecules, chemists try to build the reactive groups into the component parts which they then piece together. Thus they are forced to start with bigger, more elaborate initial components. Chemists thus need a much larger collection of possible component parts than the cell does. Nevertheless, because the characteristics of some natural products are determined by the complex final three dimensional arrangement of parts, arrangements which cannot easily be produced by piecemeal processes, the synthetic chemist is at a distinct disadvantage. This is why some products appear nearly impossible to produce in the lab, and this is why azadirachtin took 22 years to produce.

The question then arises as to why this compound was so interesting to the synthetic chemists. In fact Azadirachtin, and other compounds from the neem tree, have many interesting properties. For 2000 or more years, people in India have exploited almost all parts of the neem tree. To people living in the shade of its ample canopy, this tree represents the cornucopia tree, the free tree, the blessed tree, or the village pharmacy tree. Indeed the Latin name for the tree, *Azadirachta indica*, comes from the Persian name Azad-Darakth, meaning "the free tree". Claims for the usefulness of products from the tree include uses as a pesticide (against 200 important insect pests), as a fungicide, as treatments for malaria, leprosy, diabetes, ulcers, skin disorders and constipation! Moreover its wood is said to be resistant to termite damage.

Azadirachtin is a potent compound with a distant chemical resemblance to steroids. This compound is found in all parts of the neem tree, but is most concentrated in the seed. At

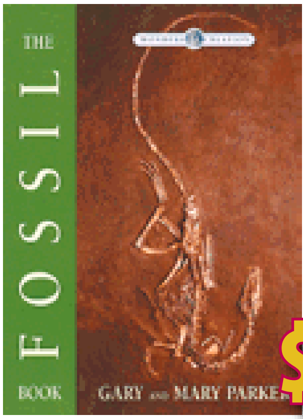


least 70 other unusual compounds are also produced by the neem tree. Until 2007, none had been artificially synthesized. Now, of course, azadirachtin has been synthesized in a program so long running and so expensive that no one would want to do it again.

In all of this, few people perhaps reflect on how amazing the neem tree really is. Related to mahogany, this attractive evergreen tree, produces chemical compounds that illustrate how poor our chemical expertise is compared to the synthesizing capabilities of this plant. Indeed the wonders of nature can only to serve to increase our awe at the amazing creation from which we all benefit.

# We tire of those pleasures we take, but never of those **we give.**

# How about it?

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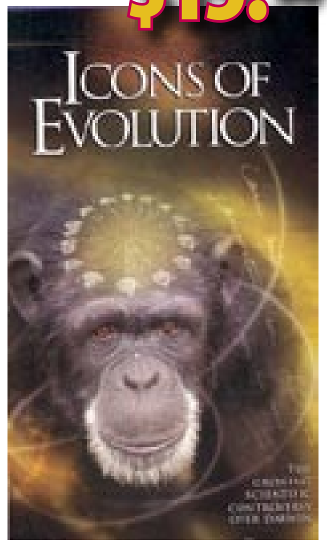
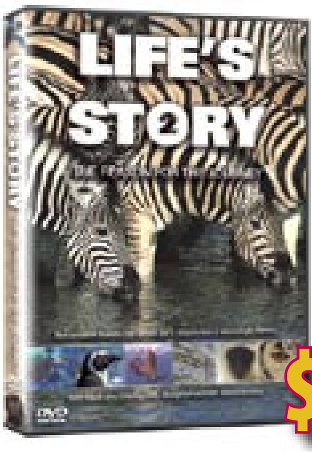



### *Icons of Evolution - DVD*

Popular icons of evolution, typically taught in high schools, are reviewed in this interesting film. The compelling discussion and rich illustrations demonstrate that the evolutionary arguments are not persuasive. Find out what the texts fail to mention. *High school to adult. - 60 minutes*

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### *Life's Story - Part 2/DVD*

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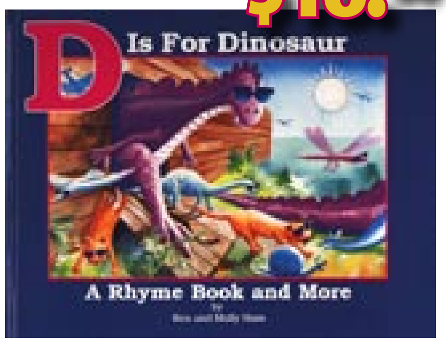


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