CHAPTER 7 - THE FOSSIL RECORD - DINOSAURS AND BIRDS

I. DINOSAURS from a non-religious perspective.

This section deals only with technical information. Section II will deal with questions that relate to the Bible, such as "What killed off the dinosaurs?"

There are many common misconceptions about dinosaurs. For instance, some people seem to think that all prehistoric reptiles were dinosaurs. This is not true.

Visual # 7-1

Since all the dinosaurs seem to be extinct, no scientist has ever written a technical description of a living one. However, it is plain to see that they are vertebrates. Beyond this obvious characteristic, we can examine bone structure to make a finer distinction. One of the most reliable indicators to show whether a fossil is a reptile or a mammal is jaw structure. If the jaw structure indicates that it is a reptile, we look for other features such as pelvic (hip) structure to establish a more detailed classification.

A. LINNAEAN SYSTEM.

Visual # 7-2

Almost all modern textbooks assume that evolution occurred and use phylogenetic charts. However, since the point of this book is to present alternatives to evolution, we will use the Linnaean system of classification according to kingdom, phylum, class, order, and so on. Following is Uetz's 2002 version, which divides Class Reptilia into 7 subclasses and 18 orders. A plus sign indicates a group believed to be extinct.

Visual # 7-3

CLASS REPTILIA

SUBCLASS ANAPSIDA (box-like skull with no holes in the temples behind the eye sockets)
- **Order Cotylosauria** ("stem reptiles" of late Paleozoic and Triassic) (+)
- **Order Chelonia (Testudinata)** (turtles)

SUBCLASS LEPIDOSAURIA
- **Order Eosuchia** (Permian and Triassic diapsids - 2 openings in temple on either side of skull behind the eye sockets) (+)
- **Order Rhynchocephalia** (living New Zealand sphenodon and similar fossil forms)
- **Order Squamata** (lizards, snakes)

SUBCLASS ARCHOSAURIA ("ruling reptiles" - diapsids, two openings in temple on either side of skull behind the eye sockets)
- **Order Thecodontia** (Triassic - supposed to be ancestors of birds and dinosaurs) (+)
- **Order Crocodilia or Crocodylia** (crocodiles, alligators)
- **Order Pterosauria** (extinct flying reptiles with membrane wings) (+)
- **Order Ornithischia** (dinosaurs with birdlike pelvis radiating in four directions) (+)
- **Order Saurischia** (dinosaurs with lizard-like pelvis radiating in three directions) (+)

SUBCLASS EURYAPSIDA (synaptosauria, one opening high on skull behind eyes) (+)
- **Order Sauropterygia** (plesiosaurs - marine Mesozoic reptiles with paddle-like limbs) (+)
- **Order Protorosauria** (+)

SUBCLASS SYNAPSIDA (mammal-like, one opening on each side of temple behind eye socket) (+)
- **Order Pelycosauria** ("primitive" Permian mammal-like reptiles) (+)
- **Order Therapsida** ("advanced" late Permian and Triassic) (+)
- **Order Mesosauria** (+)

SUBCLASS PARAPSIDA (+)
- **Order Ichthyosauria** (+) (fishlike, highly specialized for marine life)

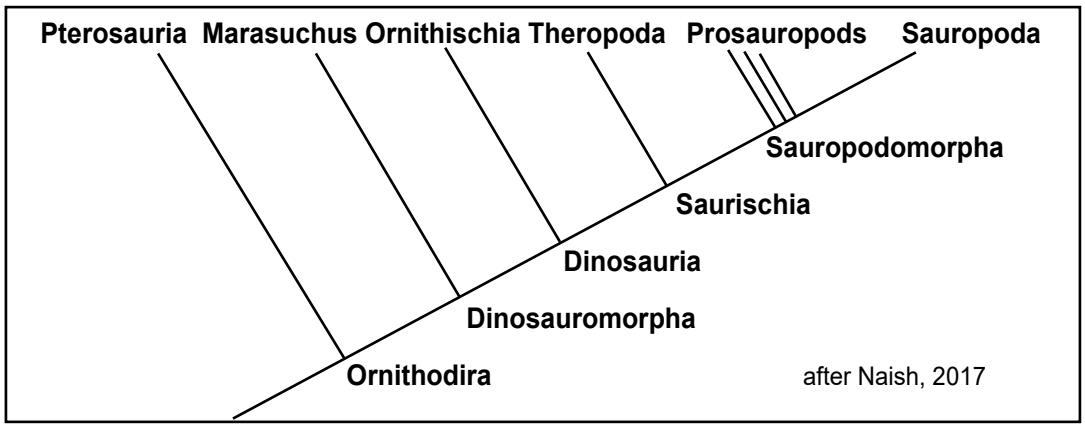
SUBCLASS ARAEOSCELIDA (obscure Permian and Mesozoic reptiles)
- **Order Trilophosauria** (+)
- **Order Weigeltisauria** (+)

(Uetz, 2002)

B. CLADISTICS.

Because there are so many opinions about how dinosaurs might have evolved, there are many variations of phylogenetic trees. They are drawn according to the features the artist thinks are most significant, e.g., the number of holes in the skull. Since different researchers have different opinions about what is important, the trees keep changing. Naish (2017) presents a simplified cladogram showing the evolution of dinosaurs and a few other types of reptiles.

Visual # 7-4



Many writers make up new terms when they are not comfortable with the Linnaean system or with existing cladograms. For instance, in the last chapter we discussed *Seymouria* and *Diadectes*. Though the former seems to have be longed to Class Amphibia and the latter to Class Reptilia, some authors do not use those designations and instead place them in *clades* such as Reptiliomorpha, roughly equivalent to Classes, and lower categories called Seymouriamorpha and Diadectomorpha, roughly equivalent to orders.

Cladograms seldom identify specific organisms as common ancestors of the major types or transitions between them. This is because those ancestors have not been found.

C. EXPLANATION FOR MISSING TRANSITIONS.

Creationists are not the only ones who point out the lack of transitions or known common ancestors. Harvard's Steven Jay Gould fought hard against the idea of creation, but also rejected the idea of gradual evolution because proposed transitions were extremely rare. Instead, he was a champion of Punctuated Equilibria. As he put it,

Visual # 7-5

> "The extreme rarity of transitional forms in the fossil record persists as the trade secret of paleontology. The evolutionary trees that adorn our textbooks have data only at the tips and nodes of their branches; the rest is inference, however reasonable, not the evidence of fossils..." (Gould, 1977, 14)

He argued that Darwin's idea that more transitional fossils would be discovered had done serious damage to paleontology. He believed instead that the changes had been too rapid to be preserved.

> "Paleontologists have paid an exorbitant price for Darwin's argument. We fancy ourselves as the only true students of life's history, yet to preserve our favored account of evolution by natural selection we view our data as so bad that we never see the very process we profess to study."

Visual # 7-6

Why is there such an extreme rarity of fossils considered to be transitions? Those who believe in the Neo-Darwinian model of Initial Disorganization believe the transitions existed but were not preserved because the process was too slow. Those who believe in the Punctuated Equilibria model believe the transitions existed but were not preserved

because the process was too fast. Those who believe in Initial Complexity believe they were not preserved because they never existed. The common thread is that the alleged transitions are extremely rare.

There is no way to prove scientifically which idea is correct. However, we can examine the fossil record to see which is more reasonable.

D. THINGS THAT WERE NOT DINOSAURS.

One of the most obvious differences between animals, whether extinct or still living, is the skull. All amphibians, reptiles, birds, and mammals have an eye on each side, but different types have different numbers of other openings.

Visual # 7-7

- Anapsids have no openings except the eye.
- Synapsids have a single opening behind the eye.
- Diapsids have two openings, one above the other, behind the eye.
- Euryapsids have a smaller single opening behind the eye, but closer to the top of the skull. They are supposed to have evolved from diapsids by a degeneration of the DNA causing the lower opening to be lost.

Like every other physical feature, the position of each opening is determined by the information encoded in DNA. The varying arrangements are supposed to be the result of a multimillion year set of beneficial random mutations.

1. "MAMMAL-LIKE" REPTILES (included among synapsids)

Visual # 7-8

Some extinct reptiles had features more like those of mammals than of the rest of the reptiles. For instance, some had several types of teeth rather than a single type, a relatively enlarged dentary bone in the lower jaw, and relatively reduced size of the other bones in the lower jaw. Like mammals, they also had a single opening on each side of the skull behind the eyes (*synapsids*), as compared to dinosaurs, which had two such openings (*diapsids*).

Cladists consider this group of animals to be closer to mammals than to dinosaurs and thus more advanced. The term "mammal-like" is seldom used any more; instead, they are commonly classified within a larger group called Synapsida. (By comparison, the dinosaurs are considered to be a subgroup of Sauropsida.) In the Linnaean system, both groups are considered reptiles.

Though considered more advanced than dinosaurs, many of the synapsids are found in lower strata, the Pennsylvanian and Permian.

Visual # 7-9

- Synapsids are considered much more advanced than *anapsids*, yet the synapsid *Asaphestera* is commonly dated about 318-314 MA, around the same time as the first undisputed reptile, the anapsid *Hylonomus* (315 MA). As noted in the last chapter, *Hylonomus* is dated about 25 million years before *Diadectes*, a supposed transition from amphibians.
- *Archaeothyris* is commonly dated to the late Pennsylvanian, ca. 306 MA.
- *Clepsydrops* is also commonly dated to the late Pennsylvanian.

Since mammals are supposed to have evolved after dinosaurs, it is difficult to explain why the "more advanced" mammal-like reptiles are found in lower layers than any of the dinosaurs.

2. MARINE REPTILES OF ORDERS ICHTHYOSAURIA, SAUROPTERYGIA, AND SQUAMOSA.

As far as we know, all the dinosaurs were land animals. However, three orders of marine reptiles (ichthyosaurs, sauropterygians, and mosasaurs) are often mistakenly called marine dinosaurs because they are supposed to have lived and died at the same time as the land dinosaurs. No common ancestor is known for the three types.

a. Ichthyosauria.

Visual
7-10

Ichthyosaurs were reptiles, but their bones show that they were fishlike in overall structure. This has interesting implications. Evolution is supposed to proceed from simple to complex as higher and higher life forms develop, but this group went from "simple" sea animals to "more complex" land-dwellers and back again.

- Natural selection is supposed to have operated on random mutations in DNA to make some sort of fish come out of the water and develop all the new features that now identified them as amphibians.
- Once firmly established on land they experienced more mutations and natural selection, gaining more new features and developing into reptiles.
- Then, through mutation and natural selection once again, they lost the legs they had acquired, went back to fins, and went back into the water. Their bodies again became well suited for aquatic life, all as a result of random mutations.

Ichthyosaurs were *euryapsids*, with a single opening behind the eye on each side. However, the opening was much higher and smaller than the animals classified synapsids.

b. Sauropterygia.

Sauropterygians such as plesiosaurs had fat bodies, short tails, and paddle-shaped limbs, rather like what some picture the fabled "Loch Ness Monster" to be. Like the ichthyosaurs, they were euryapsids, with a single smaller opening behind and above the eye on each side of the skull.

c. Squamosa (Mosasaurs).

The mosasaurs were synapsids (one opening directly behind the eye on each side) with long and snakelike bodies and webbed feet rather than fins. They ranged from about 10 to 50 feet long. Their overall shape was somewhat like the legendary "sea serpents."

None of these groups is regarded as a transitional form between fish and reptiles. Instead, evolutionists consider them as degenerate forms that returned to the water.

Since use and disuse of body parts (*Lamarckianism*) has been ruled out as a mechanism for introducing new body structures, mutations would have to be responsible. According to Initial Disorganization, there would have had to be a series of thousands of beneficial mutations, each building on all the previous ones, at the right place and at the right time. The entire process did not leave a single fossil of any of the intermediate steps, but it left many fossils of the terminal forms. The alternative is that Initial Complexity might be a better explanation.

3. FLYING REPTILES OF ORDER PTEROSAURIA.

Visual
7-11

Class Reptilia included **Subclass Archosauria**, which in turn included five orders. Of these, **Order Pterosauria** included two major groups of flying reptiles. Like dinosaurs, both of these were diapsids with two openings on either side of the skull behind the eyes.

- Rhamphorynchoids (long tails) belonged to four families found in Triassic and Jurassic rocks, and
- Pterodactyloids (short tails) belonged to 12 known families, found in Jurassic and Cretaceous rocks.

The flying reptiles appear in the fossil record suddenly. One genus, *Pteranodon*, had a wing span of up to fifty-two feet. There are no transitional forms showing a gradual increase to this size.

Pterosaurs are not considered as possible ancestors to birds because they had the wrong type of pelvis.

4. OTHER NON-DINOSAUR ORDERS IN SUBCLASS ARCHOSAURIA.

Subclass Archosauria included the pterosaurs, the two dinosaur orders Saurischia and Ornithischia, and orders Crocodilia, Thecodontia, and Pterosauria.

a. Order Crocodilia.

This order contains the only known living specimens of Subclass Archosauria: crocodiles, alligators, and the like.

b. Order Thecodontia.

Order Thecodontia is usually considered the ancestor of the other four orders of archosaurs because there is no other candidate. However, it is not connected to any of the others by any known fossil forms (Cox, 1976; Romer, 1966, 138). It is supposed to be the ancestor of all the other archosaurs, but it appears in the Triassic without known ancestors. Nor does it have any undisputed descendants.

E. TRUE DINOSAURS.

Visual # 7-12

Dinosaurs were diapsids belonging to the reptile subclass **Archosauria** and either Order Saurischia ("lizard-hipped") or Order Ornithischia ("bird-hipped").

Visual # 7-13

Some dinosaurs were as small as a chicken, while others were the largest known creatures that ever lived on land. They included the genera shown in the following chart, and perhaps many others not yet discovered (Benton, 1984; Gish, 1985; Romer, 1971; Bakker, 1992, 36-39). Since we are unable to examine living specimens, we must rely on the fragmentary evidence of fossils to draw conclusions about them. As a result, the exact number of dinosaur types is uncertain.

1. ORDER SAURISCHIA.

These "lizard-hipped" dinosaurs had a pelvis radiating in three directions with pubis bones projecting forward from the point of attachment of the leg. This arrangement allowed a heavy body to be supported well in front of the pelvis.

a. Suborder Sauropodomorpha *(large plant-eaters familiar from movies and TV)*

Infraorder Prosauropoda

At least 12 genera named so far

Infraorder Sauropoda

At least 21 genera named so far

b. ***Suborder Theropoda***

Infraorder Coelurosauria (3-6 foot plant eaters)

At least 10 genera named so far

Infraorder Ornithomimosauria ("bird-mimics")

At least 6 genera named so far

Infraorder Deinonychosauria

At least 9 genera named so far, including *Velociraptor* made famous by Jurassic Park movies

Infraorder Segnosauria

Genus *Segnosaurus*

Infraorder Carnosauria (supposed to be meat-eaters)

At least 13 genera named so far, including *T. rex* and similar forms

2. ORDER ORNITHISCHIA.

The "bird-hipped" ornithischians had a pelvis radiating in four different directions (top front, bottom front, top rear, bottom rear), with the pubis bones pointing rearward.

This allowed the digestive area to be located between the hind legs, making it much easier to stand upright. The lower jaws of ornithischians also had an extra bone, the predentary, not found in the saurischians (Dixon, 1988, 14-15).

a. ***Suborder Ankylosauria*** *(armored)*
At least 9 genera named so far

b. ***Suborder Ceratopsia*** *(horned)*
At least 15 genera named so far

c. ***Suborder Stegosauria***
At least 6 genera named so far

d. ***Suborder Ornithopoda*** *(hadrosaurs)*
At least 31 genera named so far.

Visual # 7-14

References to standard geologic time scales will be used throughout this material. Even if the geologic time scale is correct, evolution is nowhere to be seen in the fossil record.

F. SUITES OF FOSSILS CONTAINING DINOSAURS.

Visual # 7-15

Strata are identified by suites of fossils that are essentially the same no matter where in the world they are found. Initial Disorganization interprets the strata as successive time periods, whereas Initial Complexity allows for the possibility that they represent ecological communities (biomes).

Visual # 7-16

The Grand Cayman Islands south of Cuba give us an illustration of how distinct biomes can coexist in the same area at the same time. Less than half a mile off the coast of Grand Cayman Island is a sharp drop-off known as the Cayman Wall. On it are four distinct ecological communities: the reef, 0-200 feet; "the wall," 200-600 feet; "the haystacks," 600-1000 feet, and the deep, 1000 feet and below. Each zone contains a distinct community of interdependent animals and plants (Clark, 1988, 712-730). If the region were instantly frozen, then dug up by paleontologists in a thousand years, they might think it represented four time periods because the occupants seem more and more complex and advanced as they near the surface. However, this is not the case. These are four ecological communities stacked up in much the same type of arrangement we see in the fossil record. Each community is well suited to its particular environment, with little blending between them.

Visual # 7-17

The fossil record up to and including dinosaurs displays characteristics that many interpret as demonstrating this phenomenon. Though there is nowhere in the world where more than a few strata occur and though there are are many places around the world where the strata are out of the theoretical order, the Cambrian, Ordovician, Silurian, and Devonian generally contain fossils that would be suited to the deep ocean then to shallower and shallower depths. Moving higher, the Mississippian and Pennsylvanian contain the kinds of animals and plants that we would generally expect to find around sea level. The Permian contains vast numbers of amphibians.

Visual # 7-18

The "Age of Reptiles" extends through the Triassic, Jurassic, and Cretaceous. Dinosaurs are known to occur in six fossil suites: the Upper Triassic, Lower, Middle, and Upper Jurassic, and Lower and Upper Cretaceous. There is very little overlap between the six distinct groups of dinosaurs.

Initial Complexity would lead us to believe that this arrangement reflects the approximate order in which the biomes were buried, and that the frequent exceptions to the burial order are because of violent action during whatever catastrophic processes led to wide scale burial.

G. NUMBER OF DINOSAUR TYPES.

There may have been hundreds of types of dinosaurs. It is difficult to tell the exact number for several reasons:

Visual # 7-19

- We have no way to know how much genetic variability each type had. Some similar specimens identified as different genera may merely be variants within one genus.

  The categories of genus and species are defined by the ability of the specimens to interbreed. Since scientists have never seen living dinosaurs and cannot do breeding experiments on bones, the best they can do is make educated guesses. However, we have no way to know if the limits of species we have decided on are accurate. Even among humans, the differences from one person to another can be so great that we might not conclude they belonged to the same species if all we had were bones to examine.

Visual # 7-20

- Complete skeletons are rare. Many types are known only from fragments.
- At least one well-known dinosaur, *Brontosaurus*, was named by mistake. Paleontologists gave this name to a fossil only to learn that it had been discovered earlier and was already named *Apatosaurus*.

  Since many finds are fragmentary, other types may have received duplicate names as well. For instance, almost everybody has heard of *Tyrannosaurus*. Its skeleton is practically identical to *Albertosaurus* and *Tarbosaurus.* The fossil is called *Albertosaurus* when found in Canada, *Tarbosaurus* in China, and *Tyrannosaurus* everywhere else (Handwerk, 2009).
- Modern reptiles hatch as miniature versions of adults and immediately eat the same diet as adults. Mammals, on the other hand, change significantly as they grow from newborns to adults.

Visual # 7-21

  Some dinosaurs seem have aged somewhat like mammals do, changing their appearance as they mature. They may have grown structures later (head frills, different shapes of horns, etc.) that would result in an adult being identified as a different species than the young.

- Reptiles grow as long as they live, subject to at least two limitations:
  (1) An extremely large animal would have a hard time getting enough food down its throat to maintain its size, let alone grow any more; and
  (2) The heavier it got, the harder it would be for it to walk from one place to another to eat.

Unlike living reptiles, dinosaurs (and the mammal-like reptiles mentioned earlier) seem to have had legs positioned directly underneath the body. This would have enabled them to get around even after they became huge, allowing them to live a long time. Some of the largest specimens may not have belonged to different genera. They may have attained different sizes simply because they lived longer than the rest.

1. TRIASSIC ANIMALS.

(Note: reference to assigned geologic ages does not indicate agreement with them.)

One alleged dinosaur fossil, *Nyasasaurus*, has been identified in Middle Triassic strata dated about 240 MA. However, it is known only from fragments consisting of an upper arm and part of a backbone (Sawe, 2019; Than, 2012).

Visual # 7-22

The Upper Triassic is the lowest layer known to contain undisputed dinosaurs. Those that are supposed to be the oldest include *Herrerasaurus* (dated ca. 230 MA), *Coelophysis* (dated 216-196 MA), and *Guaibasaurus* (dated 225 MA). Some paleontologists have identified as few as sixteen genera from this layer, but others name as

many as fifty. Since all we have to work with are bones, there is no way to do breeding experiments to see whether animals truly belonged to different species or genera. Thus, it is impossible to know for sure whether there were really so many different types or whether there were just many variations within the kinds.

Visual # 7-23

Besides reptiles, many amphibians and marine animals are found in Triassic rocks. Initial Disorganization leads us to believe that they are found together because they lived together. But since dinosaurs are believed to have been exclusively land dwellers, it is difficult to explain how they could they have lived together with aquatic animals.

Initial Complexity, on the other hand, leads us to believe that many fossils were produced under catastrophic conditions. They did not necessarily live together but instead were thrown together as they were buried in some sort of turbulent water action. We can only speculate that perhaps the aquatic animals lived in the same general area and at similar elevations, perhaps in nearby lakes. When a major catastrophe struck, many of the animals were buried together.

Visual # 7-24

Later in this chapter we consider whether birds could be evolved from dinosaurs. At this point, we note that in 1986 paleontologist Sankar Chatterjee of Texas Tech discovered the remains of two crow-sized birds which he dubbed *Protoavis* in upper Triassic deposits in the Dockum Formation in Texas (Chatterjee, 1999). These rocks

Visual # 7-25

are dated about 225 MA, the same strata as the first theropod dinosaurs and tens of millions of years before the earliest known birdlike dinosaurs.

2. LOWER JURASSIC ANIMALS.

Visual # 7-26

Several hundred genus names have been assigned to the dinosaurs found in the three Jurassic subdivisions. Since many are based on fragmentary evidence, some of the names may be duplicates. If each of them is really a separate species or genus, there could have been scores of types in each layer. However, they do not show any pattern of simple to complex. Each type (e.g., *Dilophosaurus*, *Lufengosaurus*, *Anomoepus*) appears suddenly with no known ancestry. Once they appear they do not evolve. A few are also found in higher strata, but most appear in only this one layer and then disappear without descendants.

A number of flying (e.g., *Campylognathoides*) and marine reptiles (e.g., *Macroplata*, *Stenopterygius*, are found in the same rocks with the land-based dinosaurs. Initial Complexity leads us to believe that the land and flying reptiles did not live with the aquatic ones, but were probably swept into nearby bodies of water and buried with them under catastrophic conditions.

3. MIDDLE JURASSIC ANIMALS.

Visual # 7-27

The Middle Jurassic dinosaurs appear suddenly with nothing leading up to them. Once again, many types of land dinosaurs (e.g., *Szechuanosaurus*, *Yangchuanosaurus*, *Bellusaurus*, *Monolophosaurus*, *Spinophorosaurus*) are found buried with marine reptiles such as *Bishanopliosaurus* and *Neptunidraco*. There is no development from simple to complex among any of them.

4. UPPER JURASSIC ANIMALS.

Visual # 7-28

Upper Jurassic animals include familiar forms such as *Stegosaurus* as well as others that may not be so familiar: *Camarasaurus*, *Compsognathus* (the smallest known dinosaur, about the size of a chicken), *Othnielia* (not much bigger), the much larger *Camptosaurus*, and the giant *Diplodocus*. This layer also contains the well-known bird *Archaeopteryx*, as well as flying reptiles such as *Rhamphorynchus*.

Many of your students may be familiar with the Jurassic Park movies. They may

not be aware that *T. rex*, the star of the show, was actually a Cretaceous dinosaur rather than Jurassic.

5. LOWER CRETACEOUS ANIMALS.

Visual # 7-29

Over 500 genus names have been assigned to Cretaceous dinosaurs. Lower Cretaceous deposits contain such forms as *Sinosauropteryx*, *Deinonychus*, *Jinzhousaurus*, *Scipionyx*, *Hongshanosaurus*, *Microraptor*, *Psitticosaurus*, *Falcarius*, and many birds such as *Confuciusornis*. (Some of the names sound Chinese because many recent fossil discoveries have occurred in that country.)

6. UPPER CRETACEOUS ANIMALS.

Visual # 7-30

Upper Cretaceous dinosaurs included the famous *Tyrannosaurus rex* as well as forms such as *Tsintaosaurus*, *Velociraptor* of Jurassic Park fame (smaller than the ones in the movie), *Daspletosaurus*, *Majungatholus*, *Oviraptor*, and *Protoceratops*. The non-dinosaurs included marine reptiles such as the ichthyosaur *Elasmosaurus*, flying reptiles such as *Pteranodon*, and birds such as *Ichthyornis*.

As with the creatures in all the rest of the layers, each type appears suddenly with nothing leading up to it. Most of them are found only in this layer. They do not evolve into anything.

Visual # 7-31

Dinosaurs have been assigned a total of more than a thousand genus names, though the U.S. Geologic Survey estimates that there number may actually be closer to 300. Even if every one of them is valid, the large number of types does not tell us whether they developed from simple to complex or complex to simple.

We can use birds as an illustration. There are over 2800 named genera of birds in the world today, but the large number of types does not indicate that anything is evolving. Likewise, the existence of a large number of dinosaur types does not tell us anything about how those types came into being. Each of them appears suddenly with nothing leading up to it. Most occur in only one suite of fossils. Though a few are found in more than one suite, they do not show any directional change from their lowest to their highest appearance.

H. WERE DINOSAURS WARM-BLOODED?

Visual # 7-32

Most animals are cold blooded, that is, they match the temperature of their surroundings. Mammals and birds, on the other hand, are warm-blooded and have an internal mechanism to keep their body temperatures fairly constant.

Because a number of dinosaur fossils have been found near nests of eggs, some scientists believe that they exhibited maternal behavior and may have been warm-blooded. Perhaps some of the smaller ones were, but the larger types (*Brachiosaurus*, *Diplodocus*, etc.) could not have been. A warm-blooded animal must consume many times the amount of food that a cold-blooded animal of the same size needs to stay alive. A warm-blooded animal the size of the large dinosaurs, eating twenty-four hours a day, would have a hard time getting enough food down its throat to survive (Ostrom, 1978, 171). The larger dinosaurs, at least, must have been cold-blooded like every reptile man has ever seen.

If the smaller ones were warm-blooded, they were different from any reptiles within human experience. In this case, evolutionists are faced with a problem: natural selection is believed to assist evolution by giving a survival advantage to plants and animals that have acquired beneficial new features. Yet warm-blooded creatures are at a disadvantage. They need to eat more food because of their faster metabolism.

The problem is magnified when we consider the fact that birds and mammals, both of which are warm-blooded, are supposed to have evolved from separate orders of reptiles. Natural selection would work against evolution in both cases.

Even if some dinosaurs were warm-blooded, it would not necessarily have any scientific implications.

- Scientists in Brazil have found that unlike any other known living reptile, the Argentine black and white tegu lizard (*Salvator merianae*) seems to be able to regulate its body temperature during the reproductive season (Tattersall et al., 2016).
- The great white shark is the only known warm-blooded fish but it is not considered more highly evolved than any other fish.

Likewise, if some dinosaurs had the feature of warm-bloodedness, it would not prove anything about evolution.

II. QUESTIONS ABOUT DINOSAURS WITH RELIGIOUS IMPLICATIONS.

A. HOW LONG AGO DID DINOSAURS LIVE?

The lowest stratum containing dinosaurs is the Upper Triassic. They are also found in Lower, Middle, and Upper Jurassic, and Lower and Upper Cretaceous strata. There is a sharp disagreement between the simple-to-complex and complex-to-simple positions as to what these strata mean. Though some types are found in more than one stratum, there is no evolution from one layer to another; instead, there are six distinct suites of fossils containing dinosaurs.

- **Initial Disorganization** (simple-to-complex) interprets the strata as representing successive time periods. Thus, the dinosaurs must have died out tens of millions of years ago.
- **Initial Complexity** includes the idea that the strata represent ecological communities (biomes) that were buried under catastrophic conditions. This does not necessarily imply any specific age, and even allows for the possibility that some dinosaurs could have survived to within human memory

B. WHAT KILLED OFF THE DINOSAURS?

In Chapter One, we saw that because the subject of origins deals with the distant past, the amount of testing we can do is limited. We have to depend much more on deductive logic than we usually do in science. We start with unprovable assumptions (presuppositions) and draw conclusions from them. The presuppositions must simply be accepted as the most reasonable explanation. However, what seems reasonable to one person may seem unreasonable to another.

1. BASIC PRESUPPOSITIONS

Visual # 7-33

INITIAL DISORGANIZATION:	**INITIAL COMPLEXITY:**
a. Natural Processes Only. Every natural phenomenon must have a natural cause. As Darwin wrote in *The Origin of Species*, "If it could be demonstrated that any complex organ existed, which could not possibly have been formed by numerous, successive slight modifications, my theory would absolutely break down."	***a. Possibility of Non-Natural Processes.*** Though most physical phenomena have a physical cause, some (e.g., the origin of matter and energy, life, consciousness and self-awareness, dreams and others) may not. There could possibly be explanations outside the realm of nature.
b. Only One Possible Explanation. Since evolution is the only explanation for the universe that does not require processes outside nature, it is the only possibility.	***b. Multiple Possibilities.*** A supernatural creator would not be limited to natural processes. He could have used evolution if He wanted to, or he could have used some other method

c. Extremely Slow - old earth. Since animals and plants have never been seen to evolve from one major type to a different type within recorded human history, evolution must be an extremely slow process taking millions or billions of years.	such as described in the Bible. ***c. No Specific Amount of Time Required.*** A supernatural creator could have created over billions of years or He could have done it very rapidly. The universe does not necessarily need to be extremely old. Biblical creation implies that its age should be measured in thousands of years instead.
d. Uniformitarianism - The Present is the Key to the Past. Since the earth **has to be** billions of years old, there cannot have been any events that would explain its history in thousands of years instead. Geologic processes occur at slow, steady, gradual rates over millions of years. There can never have been a worldwide flood.	***d. Catastrophism - The Present May Not Be The Key to the Past.*** Since it may not have required billions of years for the earth to reach its present condition, it could be much younger. There could have been a worldwide flood.

2. PROPOSED EXPLANATIONS FOR EXTINCTION.

a. Initial Disorganization.

Visual # 7-34

Because a worldwide flood would cut hundreds of millions of years off the time needed to form the geologic column, it is never considered as a possibility. Some alternative proposals (PBS broadcast on *Extinction*, 2001):

i. One hypothesis says that the dinosaurs died out because of volcanic eruptions that caused global cooling. As reptiles, they were unable to deal with the cooler climate. (The question of how other reptiles could stay alive if it was too cold for even the smallest dinosaurs remains unanswered.)

ii. A related idea is that something must have happened to change the climate and kill the plants that used to serve as natural laxatives for dinosaurs, so they died of constipation.

iii. One of the most popular hypotheses is that an asteroid struck the earth about 63 million years ago, causing tsunamis and kicking up dust clouds that led to a cooler worldwide climate and brought about their extinction. Some say that the climate changed and killed them in a few years, while others say it took millions of years.

If this is correct, it might lead to problems with the geologic time scale, which is based on the assumption of uniformitarianism. If there was a sudden catastrophic event that made evolution jump forward (the Punctuated Equilibria idea), the time scale might need to be recalibrated.

The main evidence for the asteroid hypothesis is that some rocks at the Cretaceous-Tertiary boundary (now known as the K-Pg boundary) have an unusually high concentration of iridium. This element is common in meteors and asteroids. However, higher concentrations of iridium are also found in volcanic flows (P. Taylor, 1987, 23), so this is not compelling evidence for asteroid impact.

b. ***Initial Complexity***

Dinosaur fossils are found all around the world. Most, if not all, are found in water-deposited sediment, often in vast fossil graveyards. This would lead us to conclude they must have been buried under catastrophic conditions.

Though the idea is abhorrent to those who are committed to uniformitarianism, most of the dinosaurs probably perished due to the multiple effects of a vast flood. Besides rain, there would likely have been meteor impacts, volcanic eruptions, enormous geysers from water previously trapped underground, tectonic movement, and earthquakes. The ultimate cause of death, though, was the Flood.

C. HAVE HUMANS EVER SEEN LIVING DINOSAURS?

Visual # 7-35

Many are amazed that anyone would ask such a question, because throughout their schooling they have been conditioned to believe that dinosaurs died out tens of millions of years before humans evolved.

1. INITIAL DISORGANIZATION.

Evolutionists say this is impossible because dinosaurs died out more than 60 million years before humans came along.

2. INITIAL COMPLEXITY.

Pre-Flood: If strata represent ecological communities rather than time periods, it would be unlikely to find humans with dinosaurs because it would be dangerous for humans to live among animals that might eat them or step on them. Thus, it would be unlikely to find human fossils with dinosaurs.

Post-Flood: The earth's climate was much different than before. If the dinosaurs were cold-blooded like every known type of reptile, those that were unable to move to warm areas would die out quickly. However, a few may have found suitable environments and stayed alive until fairly recent times. The word "dinosaur" would not have been used to describe them because it was not invented until the mid 1800's. Thus, it is not likely that we would find it in the Bible. Nevertheless, there are a number of Biblical passages that describe animals that may have been dinosaurs.

a. Possible Biblical References.

i. Giants.

Visual # 7-36

Genesis 6:4 tells us that just before the Flood, there were "giants" in the earth. Most people understand this to refer to giant humans. However, the Hebrew word "nephilim" does not necessarily have to refer to humans. It could be a reference to giant animals such as reptiles roaming the earth before the Flood.

ii. Behemoth.

Visual # 7-37

Christians and Jews have always accepted the Book of Job as the first book of the Bible actually written down, not too many centuries after the Flood.

In Job 40:15 - 24, God instructs Job to behold "Behemoth," a huge animal with a tail like a cedar tree. No living animal has such a tail. Since something has to be present in order for a person to behold it, Behemoth must have still been alive until the Book of Job was written a few centuries after the Flood.

iii. Leviathan.

Visual # 7-38

In the next chapter of Job, verses 41:1-10 and 15-21 describe an animal called "Leviathan." It was a fearsome aquatic animal described as having tightly knit scales, so many assume it was some sort of crocodile. However, the passage also says that it breathed fire.

Though there are no known fire-breathing animals in the world today, an

animal with the ability to generate and store a flammable substance such as methane gas could produce fire. Cows emit a great deal of methane as they digest grass, though they do not store it for future use. Perhaps leviathan did. Or perhaps leviathan had a mechanism similar to that of the "Bombardier Beetle" (*Brachinus tschernikhi)*, a swamp-dwelling insect able to generate some of the chemicals that would be necessary to produce such an effect. It manufactures the chemicals hydroquinone and concentrated hydrogen peroxide, which it stores in collecting vesicles. The mixture has the potential to produce an explosive reaction if the right activating enzymes (peroxidase and catalase) are added to it. The beetle also produces and stores them. When threatened, it mixes everything together and emits a blast of steam and boiling hot, foul smelling chemicals from swiveling tubes on the rear of its body.

Visual
7-39

Whatever leviathan was, God's instruction to Job to "behold" it implies it must have survived for at least a few centuries after the Flood. Perhaps some aquatic reptile had a mechanism that was similar to that of the bombardier beetle but went beyond. If it could perform extra chemical reactions to raise the temperature of its output gases above the kindling point of carbon-based compounds, it would be able to kindle fire. (This temperature was made famous in the novel *Fahrenheit 451*.)

There are legends of fire-breathing dragons from so many places around the world that it seems reasonable to conclude that there must be some basis in fact.

iv. "Unicorns."

Visual
7-40

Older Bible translations such as the King James Version occasionally refer to "unicorns." The translators used the reference materials available to them, which included the Greek Septuagint text of the Old Testament. Whenever the Hebrew text used the word "re'em," the Septuagint translators rendered it in Greek as "monocera," which simply means a one-horned animal. (Some more recent translations say "rhinoceros" or "wild ox" instead.) However,the translators of previous centuries were not aware that there were a number of one-horned dinosaurs such as *Monoclonius*. Unless we have decided in advance that dinosaurs died out millions of years ago, we would have to include one-horned dinosaurs as possibilities for the "unicorns."

b. Modern Stories of Large Reptiles.

i. The Congo.

Visual
7-41

Natives of the Congo have reported sightings of a large animal they call "Mokele mbembe" as recently as 1995. This creature is reported to live in the deep jungle. When shown pictures of various large animals, eyewitnesses say that Mokele mbembe looks like one of the large sauropod dinosaurs *(Science Digest,* 1981, 21; Chadwick, 1995).

Scientists have not followed up on these reports for several reasons.

- Most believe all the dinosaurs are extinct.
- There have been wars going on for decades, making it too dangerous to go look for them.
- The natives refuse to show scientists where the creatures are because they believe they will kill them.
- If they really are there, we can't see them from the air because they are in

the deep jungle under a thick tree cover.

- We also cannot detect them with infrared satellite scans because cold-blooded animals match the temperature of their surroundings.

ii. Zimbabwe.

As recently as 1987, residents of northern Zimbabwe have reported seeing flying reptiles that resemble the *Pterodactyl* (P. Taylor, 1987).

c. Physical Artifacts.

i. Mosaic Floor in Zippori, Israel.

The city of Zippori (Sepphoris) in the north of Israel contains at least one possible dinosaur image preserved in mosaic tile.

When the city of Jerusalem rebelled against Rome in the first century, it was damaged but not destroyed. However, when it rebelled again in the Bar Kokhba rebellion of the second century, it was totally wiped out. A few miles to the north, the residents of Zippori saw what had happened and sent word to Rome asking that their city be spared and pledging loyalty to the Roman Empire. Their city was left intact and is now an archaeological site.

Visual # 7-42

One of the undisturbed artifacts in Zippori is a high quality mosaic floor in a house dating to the 300's. Images on the floor include humans such as the "Mona Lisa of Zippori," flowers, ostriches, and what appears to be a small dinosaur. Two men are attacking it, one with a spear and the other with a large stone. The animal has a fat body, tail held off the ground, and stripes (author's personal experience, Zippori, Israel). It is strongly reminiscent of a *Zuniceratops*, except that it does not have a head frill.

Visual # 7-43

Dinosaurs were unknown to scientists until the mid-1800's. It was only recently that they concluded that many of the dinosaurs had fat bodies, tails held off the ground, and stripes. How would the mosaic artists of the fourth century have know what a dinosaur looked like, unless they saw it themselves?

Visual # 7-44

The same mosaic floor also contains an image of a small crocodilian-type animal with an odd cloud billowing out of its mouth. It is unclear what the cloud is supposed to represent, but the artist definitely intended to show it breathing out some sort of cloud.

ii. Dinosaur Footprints.

The riverbanks of the Paluxy River in Glen Rose, Texas are largely composed of limestone, which is natural cement. The banks contain many three-toed dinosaur footprints. Since tracks cannot form in hardened cement and since limestone (calcium carbonate) is known to come out of volcanoes, we can infer that there was a flow of calcium carbonate that had not had sufficient time to harden before the dinosaurs walked in it.

Visual # 7-45

The most noteworthy feature of these tracks is that there is at least one five-toed human footprint actually inside one of the dinosaur footprints (author's personal experience, Glen Rose, TX). In order for the human print to be preserved, the limestone had to still be soft. This would imply that at least one human was there within a few hours of a dinosaur.

Those who say dinosaurs died out millions of years before humans came along refuse to accept this possibility. Though there are no known dinosaur fossils with five-toed feet, one skeptic proposed that the human-looking tracks must have been made by an unknown dinosaur with a human-looking foot.

iii. Ica Carvings.

Visual # 7-46

Many carvings of animals that look like dinosaurs have been dug up in Ica Province, Peru. They have been buried for hundreds of years, long before dinosaurs were discovered. Though the Ica Stones are in undisturbed deposits, those who say dinosaurs died out millions of years before humans came along have to say they are frauds. Otherwise, the stones would imply that humans actually saw dinosaurs (Woetzel & Swift, 2016).

iv. Ta Prohm Temple of Cambodia.

Visual # 7-47

The Ta Prohm temple in Cambodia, dating to the 1100's, contains many decorative stone carvings on its pillars. One of the carvings looks like one of the stegosaurid dinosaurs. It depicts a fat-bodied animal with several vertical plates along the length of a hunched back (author's personal experience, Ta Prohm Temple, Cambodia). It is a bit different from known forms such as *Stegosaurus* in that it has two horns rather than just a small head, but it has a definite dinosaurian appearance. Somebody in the 1100's must have seen *something* to know what to carve.

Other nearby carvings show realistic animals such as deer, boars, and monkeys. To this author's amusement, a skeptic said that one of them looked like a lion-like creature wielding a sword. It was actually a depiction of a Hamadryas baboon, common in the area, waving a stick.

d. Legends and Historical References to Dragons. *(From P. Taylor, 1987.)*

i. Babylon.

Visual # 7-48

The "Gilgamesh Epic" of ancient Babylon reports that Gilgamesh killed a large reptile that ate trees and reeds. He kept its head for a trophy.

ii. Egypt and Arabia.

The Greek explorer Herodotus (ca. 460 B.C.) reported seeing flying reptiles similar to *Rhamphorhynchus* in Egypt and Arabia. The well-known philosopher Aristotle said that in his time it was common knowledge that such creatures still lived in Ethiopia.

iii. Scandinavia.

A Scandinavian legend describes a reptile-like animal with a body the size of a large cow, with long rear legs and short front ones.

iv. France.

The French city of Nerluc was renamed to commemorate the killing of a "dragon" there. It was bigger than an ox and had long, sharp horns on its head.

v. Switzerland.

A well-known European science book, the *Historia Animalium*, reported that "dragons" were still living in the 1500's, though rare.

vi. Italy.

Italian scientist Ulysses Aldrovanus in 1572 measured and drew a picture of the carcass of a small "dragon" killed by a farmer in northern Italy. It had a long neck and tail and a fat body.

vii. Ireland.

An Irish writer (ca. 900 A.D.) reported encountering a large reptile with a head shaped somewhat like a horse's, iron-like spikes on its tail, thick legs, and strong claws.

viii. China.

China has thousands of dragon stories, carvings, and pictures.

It is reasonable to ask if the similarity of the legends of so many cultures around the world is just a coincidence, or if perhaps there is some basis in fact behind all of them.

D. HOW COULD ANY DINOSAURS HAVE SURVIVED THE FLOOD FOR HUMANS TO SEE THEM?

A worldwide flood would have killed every air-breathing land animal except those on Noah's Ark. If the legends above are based on large reptiles that were alive to within human memory, how could any of them could have survived the Flood? And how could all those dinosaurs have fit on a single boat?

Visual # 7-49

1. GOD BROUGHT THE ANIMALS.

Noah did not select the animals that came onto the Ark. God brought them to him.

2. MOST DINOSAURS WERE NOT HUGE.

Only a few genera, perhaps a few dozen, grew to enormous sizes. Most of the rest were fairly small. Even the largest ones hatched from eggs that were not much bigger than a football. It would have taken them years to grow to the sizes of the largest known specimens.

3. CONTINUAL GROWTH OF REPTILES.

A reptile grows as long as it lives, as long as it does not get too big to move around. We do not know how long it took the large dinosaurs to reach the sizes we see in the movies, but it would make sense to believe that those on the Ark were probably smaller than elephants.

Even an unintelligent person could figure out that it would be a bad idea to bring enormous full-grown sauropods on a boat. It would have made sense to bring young specimens on the Ark instead of old ones. They could have fit more easily and they would have had much more time to breed after the Flood.

$. SIZE OF THE ARK.

Visual # 7-50

The Ark was much larger than most people imagine. It was the biggest boat ever built until the 1860's. Based on the dimensions described in the Bible, it had a cargo capacity of almost 1.4 million cubic feet (almost 40,000 cubic meters), roughly equivalent to 522 railroad stock cars. It would have easily accommodated over 125,000 sheep-size animals (Bliss, 1976).

Most animals are much smaller than sheep. Since Noah only had to take on a pair of each "kind" rather than each breed or species he would only have needed room for at most a few tens of thousands of sheep-size animals. (The "Ark Encounter" in Kentucky estimates that the number was low as a few thousand.) Even if Noah had to take several hundred pairs of elephant-sized dinosaurs he still would have had room to spare.

Some might object that since dinosaurs are not mentioned in the Bible, they must have died out before Genesis 1:2. This a poor argument.

- First, the Bible does not mention kangaroos, orangutans, skunks, and many other well-known animals. This does not mean that they died before Adam.
- Second, as we have already seen, the Bible refers to several creatures that may have belonged to some reptilian group: "behemoth," "leviathan," dragons, and "unicorns."

E. WERE DINOSAURS FEROCIOUS PREDATORS?

Roaring dinosaurs add excitement to movie scenes. However, anyone who has spent time in a swamp knows that the living reptiles supposed to be their closest relatives, alligators

Visual # 7-51

and crocodiles (members of the same subclass as dinosaurs), make noise only when startled. There is no reason to believe dinosaurs were different.

Were dinosaurs carnivores? Genesis 1:30 tells us that at the end of the creation week all the animals were vegetarians:

> "And God said …to every beast of the earth, and to every fowl of the air, and to every thing that creepeth upon the earth, wherein there is life, I have given every green herb for meat: and it was so." (KJV)

Exodus 20:11 reiterates that "in six days the LORD made heaven and earth, the sea, and all that in them is." This means that every type of animal was made during the Creation week. Thus, at the end of the creation week all of them were vegetarians, though they may have begun to eat meat later. Even the most famous predator, *T. rex*, had teeth that would have pulled out if it had bitten one of the large sauropod dinosaurs. If it ate meat, it probably ate smaller animals. Or perhaps it was a scavenger.

Visual # 7-52

Scientists recognize that that most dinosaurs were plant-eaters. Only two dozen or so genera, all members of **Order Saurischia**, are believed to have eaten meat. Though we can use logic to analyze their bones and teeth, we cannot be sure what any of them really ate because we have no eyewitness accounts.

- Creationists believe that if some dinosaurs ate meat, they began to do so only after Adam sinned. Perhaps their preferred kinds of vegetation became unavailable.
- Those considered meat-eaters had long, sharp teeth - but so do pandas, beavers, and fruit bats, which eat plants unless meat is the only food available.

  We have never seen a *Tyrannosaurus* eat anything, but we can tell from fossil skulls that their teeth were not very deeply rooted in their jaws. Biting into a large animal that did not want to be eaten might have cost them quite a few teeth. If they ate meat at all, they probably ate small animals or decaying carcasses.

Visual # 7-53

Dinosaurs may not have been very fast either. Anyone who saw the movie "Jurassic Park" no doubt remembers the scene where the *Tyrannosaurus* tried to catch a Jeep and eat the passengers. It was exciting but not realistic. A large dinosaur's speed would have been limited by the ability of its leg bones to withstand the impact of its enormous weight as it ran. The faster it went, the greater the impact.

A 1991 study of dinosaur leg bones analyzed their ability to withstand such impact, based on diameter, density, and porosity. The study concluded that they would have broken if a large animal such as a *Tyrannosaurus* tried to run more than about 15 miles per hour (Alexander, 1991). It is unlikely that a large dinosaur could have run fast enough to catch many smaller animals, let alone a Jeep.

III. SUMMARY OF INFORMATION ABOUT DINOSAURS.

To recap what we have seen about dinosaurs:

Visual # 7-54

- Dinosaurs are found in six suites of fossils: Upper Triassic, Lower, Middle, and Upper Jurassic, and Lower Upper Cretaceous.
- Ages are assigned based on the uniformitarian assumption of how long each suite would have taken to evolve, not based on any testable method.
- Each type of dinosaur appears in the fossil record suddenly without known ancestry.

Visual # 7-55

- Any dinosaurs found in more than one suite do not show any indication of evolution from their lowest ("first") appearance to their highest ("latest").
- Dinosaurs are completely compatible with the Bible and with the Initial Complexity idea derived from it.

IV. DID BIRDS EVOLVE FROM DINOSAURS?

Anyone who goes to dinosaur movies or reads biology textbooks will be inundated with the idea that dinosaurs are not really extinct, but just evolved feathers and turned into birds. What evidence is there to support such a claim?

A. ARGUMENTS *FOR* DINOSAUR TO BIRD EVOLUTION.

Visual # 7-56

1. PELVIS.

One of the two orders of dinosaurs, **Ornithischia**, had a pelvis similar to that of birds.

2. OVERALL SHAPE.

Some of the "bird-mimic" dinosaurs such as *Gallimimus*, *Ornithomimus* and *Struthiomimus*, had an overall shape reminiscent of large birds such as ostriches.

3. REPTILIAN FEATURES.

A fossil bird found in Jurassic rocks, *Archaeopteryx*, had some characteristics often found in reptiles, such as teeth and claws.

4. FEATHERS.

There have been recent claims that some dinosaur fossils showed indications of feathers.

5. NO OTHER PLAUSIBLE ANCESTORS.

Birds had to come from *somewhere*. The only other type of animals built somewhat like them are dinosaurs.

B. ARGUMENTS *AGAINST* DINOSAUR TO BIRD EVOLUTION.

Visual # 7-57

1. ORNITHISCHIA VS. SAURISCHIA.

Ornithischians, those with a bird-type pelvis, are the wrong order of dinosaurs. Birds are supposed to have evolved from one of the theropods of Order Saurischia (*lizard*-type pelvis) such as dromaeosaurs.

Though the difference in pelvic structure is seldom mentioned, it is a major problem. Some ancient "stem reptile" with a lizard-type pelvis had to have information in its DNA that was able to undergo mutations so that some of its descendants evolved bird-type pelvises, while others kept the lizard-type for millions of years.

Much later, some of the theropods had to undergo the same type of mutations as the ornithischians so that their lizard-type pelvises independently developed into bird-type pelvises and helped turn them into birds. Meanwhile, they had to be able to walk despite the major structural changes. However, this multimillion year process did not leave a single fossil showing the transition from lizard-type to bird-type.

2. INTERNAL STRUCTURES OF BIRDS.

While the "bird-mimics" such as *Struthiomimus*, *Gallimimus*, and *Ornithomimus* superficially looked a little like ostriches, the internal structures of every known reptile are vastly different from those of any known bird.

Visual # 7-58

a. Lungs.

In mammal and reptile lungs, air flows into sacs, exchanges gases with the bloodstream, then flows back out. Birds also have sacs, but they are not used for gas exchange. Instead, they are used to change pressure inside the lungs, causing air to be drawn in and pushed out. The gas exchange takes place in *air capillaries*, tubules that extend deep into other parts of the body (even the brain). Birds use two respiratory cycles to move the air through the entire respiratory system, whereas other creatures use only one. Birds are able to transfer oxygen more efficiently, but this also makes them more susceptible to harmful gases. This is the reason canaries were used in mines as indicators of poisonous gases. They die long before humans (*"Ask a Vet Online 24/7"*).

b. Body Temperature.

Reptiles match the temperature of their environment (cold-blooded), whereas birds maintain a fairly constant temperature (warm-blooded).

c. Brain structure.

Birds have a highly developed cerebellum and cerebral hemisphere to control their fine motor movements. This allows them to perform the complex body movements needed for flight (Wilson, 2014).

d. Wing vs. arm movement.

Flapping requires the wings to move backwards from the body. This is the opposite type of motion from walking and grasping, which require the limbs to move forward.

e. At least 12 different types of Feathers.

Visual
7-59

Feathers are unknown in any class other than birds, but are found in every bird.

How would such a structure have evolved? There would have to be a series of more and more birdlike reptiles. Mutations in DNA would cause the scales to gradually fray, ultimately developing into the intricate pattern of hooked fasteners (similar to Velcro®) we find in feathers.

The evolving ancestors would have started with impermeable solid scales, gone through a stage of permeable frayed scales, then back to impermeable feathers (Denton, 1986). *Archaeopteryx* does not show such a development; Gregory tells us that its feathers

"differ in no way from the most perfectly developed feathers known to us." (Gregory, 1916).

The problem is far more complicated than just inventing a scenario in which any type of feather could gradually evolve from any type of scales. There are at least 12 distinct types of feathers known (Bergman, 2003), such as:

- Down feathers used for insulation.
- "Powder-down" feathers which not only insulate but also release a talc-like powder that helps in waterproofing.
- *Filoplume* feathers used for decoration and sensory input.
- *Bristle* feathers such as those found on flycatchers.
- *Remiges*, strong feathers used in fast powered flight by hawks, pigeons, and the like.
- A different variety of remiges, soft ones such as those used by owls for slow, silent flight.

Most birds use multiple types of feathers. Yet despite the fact that they are supposed to have evolved from scales, *none* of the feather types shows any structural similarity to scales.

Feathers enable birds to vary the geometry and aerodynamic properties of their wings for different purposes: takeoff, landing, flapping, gliding, and soaring. Many birds have an intricate system of tendons which allow the feathers to twist and open like the vanes of a blind on the upstroke but close completely on the downstroke. This greatly improves the efficiency of flight.

Feathers also solve the problem of turbulence, which reduces lift and causes stalling. Only recently have engineers discovered how to simulate some of their features to increase stability in airplanes. As Denton says, "One need only watch the darting-backwards-and-forwards flight of the humming bird to grasp something of the excellent aerodynamic properties of the feathered aerofoil." (Denton, 1986)

3. WHY WOULD ANYTHING EVOLVE?

Visual # 7-60

Every living thing gets its physical characteristics (its phenotype) from the information contained in its DNA (its genotype). Mutations are random copying mistakes during DNA reproduction. In order for anything to evolve, there would have to be a series of thousands or millions of beneficial mutations in DNA, despite the multiple error-correcting mechanisms in cell reproduction. The mutations would have to build up generation after generation, becoming the source of new structures (bones, eyes, wings, feathers, etc.). Meanwhile, only one out of the hundreds or thousands of hypothetical transitions was preserved as a fossil, and it is a very weak candidate. (See below.)

4. FOSSIL BIRDS - ARCHAEOPTERYX.

One of the fossils most often presented as an example of a transition between major types is a bird known as *Archaeopteryx*.

a. Reptilian characteristics.

Visual # 7-61

It had certain characteristics found most often in reptiles: a long bony tail, claws on its wings, a relatively shallow breastbone, and teeth. But so do other undisputed birds.

- Living swans have long bony tails.
- Living ostriches, hoatzins, and touracos have claws.
- Hoatzins have a relatively shallow breastbone.
- Two undisputed fossil birds, *Hesperornis* and *Ichthyornis*, also had teeth.

b. Avian characteristics.

It had other characteristics usually associated with birds: hollow bones and feathers.

c. Wrong timing.

Visual # 7-62

Archaeopteryx is known from the Upper Jurassic, supposedly around 150 million years ago. It should have evolved from much earlier dinosaurs that had evolved an ornithischian pelvis. The rest of the birds are then supposed to have evolved from it. Therefore, they should appear in strata more recent than the Upper Jurassic. However, in 1986 paleontologist Sankar Chatterjee of Texas Tech discovered the remains of two crow-sized birds which he dubbed *Protoavis* in late Triassic deposits in the Dockum Formation in Texas (Chatterjee, 1999). These rocks are dated about 225 MA, seventy-five million years older than those in which *Archaeopteryx* was found. This means that *Archaeopteryx* is 75 million years too late to be the ancestor of the other birds. Not only that, *Protoavis* appeared in the same strata as the first theropods and tens of millions of years before the earliest known birdlike dinosaurs. Since it was there first, it would be difficult for it to be descended from them.

d. Inadequacy as an ancestor.

Visual # 7-63

If we accept *Archaeopteryx*, *Protoavis*, or any other ancient creature as the ancestor of modern birds, which birds? There are around 2800 known genera in the world today, as well as many in the fossil record. Any transition from reptile to bird would have to have had the potential in its DNA to give rise to intermediate forms (of which none are known) leading to ostriches, cassowaries, eagles, owls, hummingbirds, penguins, finches, parrots, vultures, pigeons, chickens, ducks, pelicans, woodpeckers, and all the thousands of other living forms, as well as the extinct ones like the huge "terror bird" *Phorusrhacidae*. All this evolution of thousand of types would have to take place in spite of the error-correcting mechanisms built into DNA.

5. "FEATHERED DINOSAURS"

Visual # 7-64

In recent years there have been reports that some dinosaur fossils appear to have had feathers. Many are skeptical of the reports because the alleged feather impressions are so faint. Even if some dinosaurs did have feathers, it would not prove anything.

- Details are almost never given about which of the 12 or more types of feathers they are supposed to have been.
- We usually think that only birds have feathers. Likewise, we usually think of mammals as giving birth to live young rather than laying eggs. However, two types of mammals (the platypus and the echidna) lay eggs.
- We do not think of mammals as poisonous, but the platypus has poison glands.
- We do not think of fish as warm-blooded, but the great white shark is.

Likewise, even if the reports of feathers on dinosaurs are verified, it would only show that we do not know as much as we think we do.

V. CHAPTER SUMMARY.

Paleontologists have classified fossils into hundreds of thousands of species. If the idea of creation (initial complexity) is correct, each type should have appeared in the fossil record suddenly with its ordinal characters already present. On the other hand, if evolution (initial disorganization) is correct, each type of organism should have gradually changed in the direction of simple to complex. There should be far more transitional forms than terminal ones.

Out of the hundreds of thousands of fossil species, at most a few dozen fossil types have been proposed as transitions. Though there are some alleged evolutionary sequences of invertebrates such as sea shells, the ones we have considered in this chapter are among the most commonly accepted by the general public. They are accepted not because of detailed analysis of fossil evidence but because they are presented as transitions in movies and similar media. As we have seen, though, there is no clear fossil sequence showing any of the following:

Visual # 7-65

- How fish might have evolved into amphibians;
- How the first dinosaurs might have evolved;
- How a species or genus of dinosaurs in one fossil suite (e.g., Upper Triassic) might have evolved into a different type found in a different suite;
- How dinosaurs might have evolved into birds.

Each type appears in the fossil record suddenly, with its ordinal characters already present. This phenomenon does not scientifically prove creation, but it is much more compatible with the concept of Initial Complexity than with Initial Disorganization.