SYMPOSIUM ON VARIATION–V

ORIGINAL KINDS AND TURTLE PHYLOGENY

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Abstract

Creationist biologists have discussed and made limited progress toward understanding various extinct and extant forms of life within a discontinuous (or baramin) model. As an example, the turtle appears abruptly in the fossil record. Among the various scientific approaches directed at understanding possible turtle diversification has been biochemistry in which serum proteins primarily have been utilized. A challenge is given for systematics researchers to investigate nature utilizing a baramin concept.

Introduction

A goal among creationist biologists has been an understanding of fauna and flora with regard to the basic "taxonomic" groupings to which they belong. This systematic viewpoint is stated concisely in the constitution of the Creation Research Society, namely that:

> All basic types of living things, including humans, were made by direct creative acts of God during the Creation Week described in Genesis. Whatever biological changes have occurred since Creation Week have accomplished only changes within the original created kinds. Article II—Statement of Belief, Section 2.

The word "kind" is a translation of the Hebrew *min* used by the inspired author of Genesis as well as other authors of Biblical books. It commonly is understood to refer to the basic plant and animal groupings found in nature (see Payne, 1958; Jones, 1972 a, b). These groups would not be related physically by descent from common ancestry with other groups. Rather each would constitute its own genetic entity since each is a separate creation of God. The systematic position is a *discontinuity model* (ReMine, 1991) which is characterized by a forest of trees—each tree being a "kind" with living organisms at tips of all the branches. The macroevolutionary model, on the other hand, is a continuity model in which all living animals and plants would be found at tips of branches of a single large tree.

Terms proposed for the basic (Genesis) kinds include baramin (from the Hebrew *bara,* create plus *min,* kind), (Marsh, 1941) and prototype (Lester and Bohlin, 1989). The former word has become increasingly popular, and recently a new systematic methodology called baraminology has been proposed for approaching an understanding of all nature with a discontinuity model (Wise, 1991).

Turtles and Serology

During the past 30 years I have been involved in a comprehensive biochemical study of all types of turtles for the purpose of understanding their diversification. These studies have involved use of serum proteins. However, for two years I did engage in hybridization of erythrocytic DNA from several turtle types. Results showed that the DNAs compared were quite similar (Frair, 1967). I think that systematic interpretation of results from nucleic acid experiments are far more difficult to understand (for example because of introns, "pseudogenes," etc.) than are those utilizing proteins from adult organisms. My choice has been the serum proteins, all of which circulate through all organs of the body. Some studies have involved only single proteins such as the relatively small protein, albumin (for example, Mao et al., 1987; Yin et al., 1989). It can be advantageous to compare smaller proteins because they are not as likely to experience changes as are larger proteins, but I still consider that those projects having the greatest taxonomic and systematic value utilize multiple proteins.

My methodologies have involved electrophoresis and various immunological procedures, mostly quantitation of precipitation in fluid, semifluid and solid media (Frair 1985a). Some of my early studies demonstrated that chelydrids (snapping turtles) unexpectedly are more like emydids than like kinosternids, that the Mexican *Staurotypus* was like *Dermatemys* (a kinosternid), that all five types of sea turtles, including the leatherback, *Dermochelys,* were quite close, and that softshell turtles were distinct from most other types (Frair, 1964).

These conclusions have been extended and confirmed by later projects—the position of chelydrids, of *Staurotypus* and *Dermatemys* (Frair, 1972), unity of sea turtles (Frair, 1969, 1979, 1982c; Frair and Prol, 1978), the position of softshells among turtles (Frair, 1983b). A later broad survey which included softshells still showed them to have distinct proteins, and another distinct type of turtle, the plateless river turtle, *Carettochelys,* from New Guinea and Australia, was most like certain softshells (Frair, 1985c).

Other biochemical studies have involved the sideneck turtles (Pleurodira) from South America, Africa, Madagascar, and Australia. There is a stock of *Podocnemis* in South America; and one of these species was removed to the genus *Peltocephalus* and the one Madagascar *Podocnemis* to *Erymnochelys* (Frair et al., 1978; Frair, 1982b). A very distinct South American sideneck, *Hydromedusa,* shows some likeness to Australian forms. Both genus *Emydura* and *Chelodina* from Australia share serum protein similarities with South American Shelids. So it appears that forms in South America and Australasia did not diverge in isolation (Frair, 1980).

While there are many species of turtles in North America—southeast U.S. being one of the best places

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in the world to find a diverse turtle fauna—aquatic habitats in northern Europe (as in France and Germany where many human American families have originated) have only one living endemic species, the European pond turtle, *Emys orbicularis.* Protein studies indicate considerable similarity between this form and the North American Blanding's turtle *Emydoidea blandingi* (Frair, 1982a; Seidel and Adkins, 1989).

Some batagurin turtles are common in Asia but not in North America. Evidence suggests that batagurins may be closer to a basic turtle ancestry than are emydins (like *Emys* and *Emydoidea).*

It could be that land turtles (tortoises) and the European *Emys* originated from Asian ancestry. The turtle with serum proteins most like *Emys* is the American *Emydoidea* which could have shared close ancestry with *Emys* and then in the United States diversified to produce a complex of turtles including the wood turtle, spotted turtle, bog turtle, box turtles and western pond turtles (Frair, 1982a, 1985 a, b).

Turtle Origin(s)

With regard to the initial origin of turtles, fossilized remains have been discovered in various regions of the world. Some of these greatly exceed in size even the largest type living today which is the giant leatherback possibly weighing 600 kg (1320 lbs). Fossilized turtles testify to a far greater chelonian diversity than is found today, but the first turtles, as evolutionist Pritchard (1979a) has noted, "shed little light on the evolution of the order Testudines from its presumed cotylosaurian ancestors" (p. 73). The first turtles, although differing in some features from extant forms, clearly were turtles. In his treatment on the "Origin of Reptiles" evolutionist Carroll (1969) said:

> The earliest and most primitive turtles, placed in the suborder Proganochelydia, are known from the Upper Triassic of Germany. Descriptions of these forms, by Jaekel (1916) and others, indicate that they are already unquestionably turtles in most features of their anatomy and show little, if any, affinity with other groups of reptiles . . . At present the ancestry of turtles is subject to considerable speculation (p. 9).

In 1939 the Sri Lankan scientist, P.E.P. Deraniyagala, published a drawing of his conception of a "missing link" leading to turtles. He termed it "The Saurotestudinate," a scale-covered lizard-like creature which he described as:

> probably a slow-moving, tooth-jawed [all extant turtles lack teeth] marsh dweller, which originally arched its back and attempted to hide its head by humping its shoulders as do many living burrowing frogs when alarmed (p. 26).

He conceived of it as possessing some leatherback features. But Mlynarski pointed out, as noted by Pritchard (1979b) regarding Deraniyagala's turtle evolution concept, "there is no fossil evidence to support this hypothesis"(p. 5).

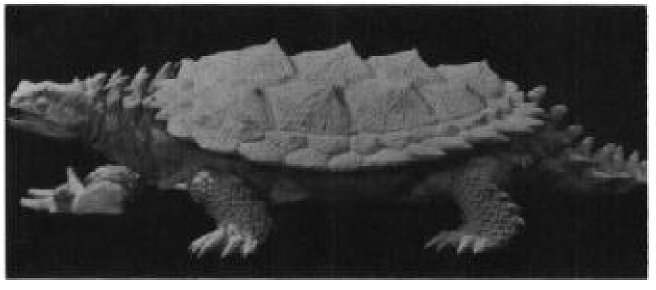
For decades it was held that the South African *Eunotosaurus* represented an ancestral chelonian, but especially since the 1960's it has become increasingly clear that this form is not a missing link between cotylosaurs and turtles but rather a deviant cotylosaur (see Carroll, 1969; and Pritchard, 1979a,b).

Also see evolutionist Obst (1988), who discusses *Eunotosaurus* as well as the Placodontia, both of which he refers to as turtle "imposters" whose similarities to turtles are believed by evolutionists to represent convergence. Obst speaks of turning to "conjecture" in searching out turtle origins.

Evolutionist E. S. Gaffney, a leading world expert on fossil turtles, refers to the turtle as "God's noblest creature" (Gaffney and Meylan 1988, p. 161) -- the first being *Proganochelys* with its fully formed shell (Gaffney and Meeker, 1983; Gaffney and Meylan, 1988; Gaffney, 1990; see Figure 1). Gaffney and Meylan (1988, p. 160) point out that efforts have been made to discover turtle ancestry, but there is no consensus. Halliday and Adler (1986) also reflect that the turtle with its fully formed shell appears abruptly in the fossil record.

All the authorities referred to above believe that turtles evolved from some ancestry, even though it is not clear what this is. They are quick to point out, however, that the first turtle differs from modern forms. There has been considerable diversification which has produced some extinct fossil turtles and the present 250 living species of turtles. I want to acknowledge that any lack of agreement or uncertainties among authorities regarding turtle phylogeny does not necessarily prove that God created *Proganochelys* or any other turtles. However, available evidence is consistent with an abrupt appearance of a turtle kind as exhibited by *Proganochelys.*

If *Proganochelys* is not related by descent from some unknown terrestrial ancestor, then it would have been engendered either by some *natural* (cosmic?) process or by *supernatural* intervention. Either of these alternatives is preferred on the basis of an investigator's "world view" including the presupposi-



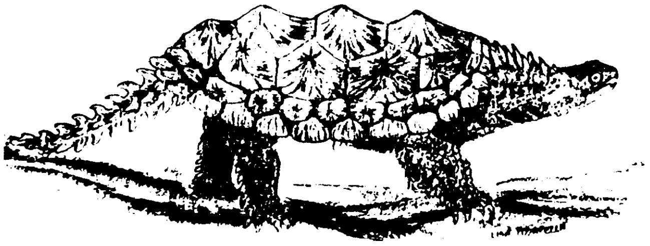


Figure 1. Upper. Life restoration of *Proganochelys quenstedti* sculptured by David Dann. This animal is "roughly comparable" in size, morphology, and possible habitat to *Macroclemys temmincki,* the living alligator snapping turtle (see Gaffney, 1990, p. 25). Photograph supplied by Eugene S. Gaffney.
Lower. Artist Lisa Pizzarella's conception of the same specimen in a more active position.

tions with which a study of nature is approached and conclusions drawn. For me the supernatural perspective is logical and satisfying.

There are two main types of turtles—the straight necks, Cryptodira, and side necks, Pleurodira. If turtles belong to a monotypic baramin, perhaps *Proganochelys* is the closest ancestor for both of these groups. This is my present viewpoint. A few years ago I suggested that possibly turtles constituted a polytypic baramin with as many as four diversification lines (Frair, 1984). Even though this is not my current position, I still consider it a reasonable hypothesis worthy of further consideration.

For the best understanding of variation which has ensued within baramins we need multiple approaches which include morphological (macroscopic, microscopic and molecular), physiological, behavioral, etc. studies. The various biochemical investigations utilizing proteins and DNA may be thought of basically as "comparative anatomy" at the level of molecules—molecular morphology. These types of studies have aided in our conceptions and reconstructions of the history of turtle diversification.

If indeed a "kinds," that is, a baramin concept, is to be preferred by systematists—and *there is* strong evidence that it is the best working hypothesis (mainly because of the discontinuities between fossil groups and also between living groups) —then creationists and other scientists need to take more seriously the challenge of studying the various plant and animal groups from this perspective.

There have been efforts to encourage the scientific community to think and to research on the basis of "kinds" (see Frair, 1958, 1983a, 1984; Jones, 1982; Lester and Bohlin, 1989; Marsh, 1941, 1976, 1978, 1981, 1982, 1987; Siegler, 1974, 1978, 1983). A new impetus has been provided recently by ReMine (1991) and Wise (1991). The future of the creationist movement within the scientific community very well could depend upon whether this challenge is accepted seriously by creationist researchers.

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Addendum

Reisz and Laurin in a recent treatment on turtle origins point out that turtles have "substantial fossil records," but that their "origins and relationships . . . have remained unresolved." (p. 324) Their suggestion for the evolutionary dilemma implicates a small South African parareptile, *Owenetta.* If their conclusion were true, then as Fraser has pointed out, there are implications affecting our understanding of the integrity of the whole reptilian class. So we continue to have a phyletic muddle. One way I believe scientists can move toward extricating themselves from this condition would be to give more serious attention to an abrupt appearance (discontinuity) model.

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SYMPOSIUM ON VARIATION—VI

THE LIMITS OF BIOLOGICAL VARIATION

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Abstract

The topic of biological variation in nature is approached from its philosophical and biblical parameters, rather than from the approach of a research scientist.

Introduction

When attempting to understand the limits of biological variation, it is important to recognize certain realities which exist within the world of nature and to operate within those realities. Living organisms, for example, exist according to types or kinds, and that reality makes it possible to classify organisms systematically as taxonomists do. Organisms of a given type, such as roses, corn, dogs and human beings, are known to have the capacity for a limited amount of variation. That reality is often spoken of as microevolution which, essentially, is a reshuffling of existing genes; there is no generation of new genetic information but merely mutation of existing genes.

Law of Biogenesis

Every organism is what it is because of the built-in genetic information present in its parents. Organisms are programmed entities; they have no option of being anything other than what they are programmed to be. Information, in turn, always comes from intelligence, never from nonintelligence; that, too, is one of the realities in the world of nature. The programmed information which resides in the DNA molecule (deoxyribonucleic acid) was imposed on the physics and chemistry of that molecule by an intelligent Being at the time the first organism of a given type was created. The programming of the DNA molecule was a supernatural event by a supernatural Being, namely, the God Who, according to Genesis 1, created a wide assortment of living creatures, each according to its own kind; and He programmed each one genetically to reproduce its kind. Thus in terms of the order of creation, the kinds or types are stable throughout time. That is confirmed by a widely accepted law, namely, the law of biogenesis, the essence of which is that life always comes from life of the same kind.

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The genetic information built supernaturally into the DNA molecule is present in such a way that in the process of reproducing, an organism not only replicates itself but does so in such a way that the offspring is slightly different from its parents, yet always of the same type or kind. The genetic programming by the Creator precludes unlimited variation; roses always reproduce roses irrespective of the numerous varieties which are derived and human beings always give birth to human beings, as different as they may be. Through this inbuilt genetic information, the Creator guarantees that the many kinds of originally created plants and animals will remain in existence generation after generation. This stability (stasis) of organisms is also one of the pronounced characteristics which is observed in fossil organisms and the fossil record itself is likewise one of the great realities of nature.

Design

In consequence of the more detailed knowledge about the structure and operation of the biological cell known through the relatively new science of molecular biology, it is more obvious than ever that organisms are products of *design* and that each kind of organism has its own unique features. Two centuries ago William Paley (1743-1805) perceived nature as possessing design, and he published a book entitled *Natural Theology* (1802). Although philosophers and others have attempted to blunt Paley's argument of design, the realities of the biological world as they are known through molecular biology reveal more clearly than ever before that behind every living organism