Flood Geology Sheds Light on Unaweep Canyon Mystery

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Abstract

The topography of West Central Colorado provides challenges for historical geology. The scale of features necessitates a cataclysmic process in order to accommodate a young earth chronology. Implications for current creationist theories regarding the rapid formation of the Grand Canyon are described. Steam superposition at Unaweep Canyon is an area for creationist research. This involves issues regarding the incision of Unaweep Canyon into crystalline rock and the time of canyon formation. The author proposes multiple episodes of drainage of flood waters.

Introduction

Two erosion features differing by orders of magnitude are represented in Western Colorado. The larger feature is the Grand Valley and its extension, the Uncompahgre Valley, the basic structure of which is represented in Figure 1. The master valley has a width of ranging from 10 to 20 miles and lies at 4600 feet elevation above sea level at Grand Junction. Up the Colorado River 89 miles from Grand Junction the valley is narrower but elevations similar, with an adjacent flat-lying strata (the "Flat Tops") over 10,000 feet in elevation.

Adjacent to the Grand and Uncompahgre Valleys are broad, elevated flat-lying areas: Grand Mesa (a true mesa to the east of Grand Junction roughly 15 miles at over 10,000 feet elevation), the crest of the Uncompahgre Plateau, and the Roan Plateau north of this study area. The Colorado River leaves this broad valley near Fruita, but the valley remains broad as it opens into Central Utah, as illustrated in Figure 2.

Table I shows the gradual increase in elevation in the river system over many miles.Into this general topography are eroded numerous "smaller" canyons. Into the flanks of the Uncompahgre Plateau are canyons with depths of up to 700 feet. The most spectacular are those for which the Colorado National Monument was named a park. Other canyons are etched into the flank of the plateau through the 80 mile length of the plateau.

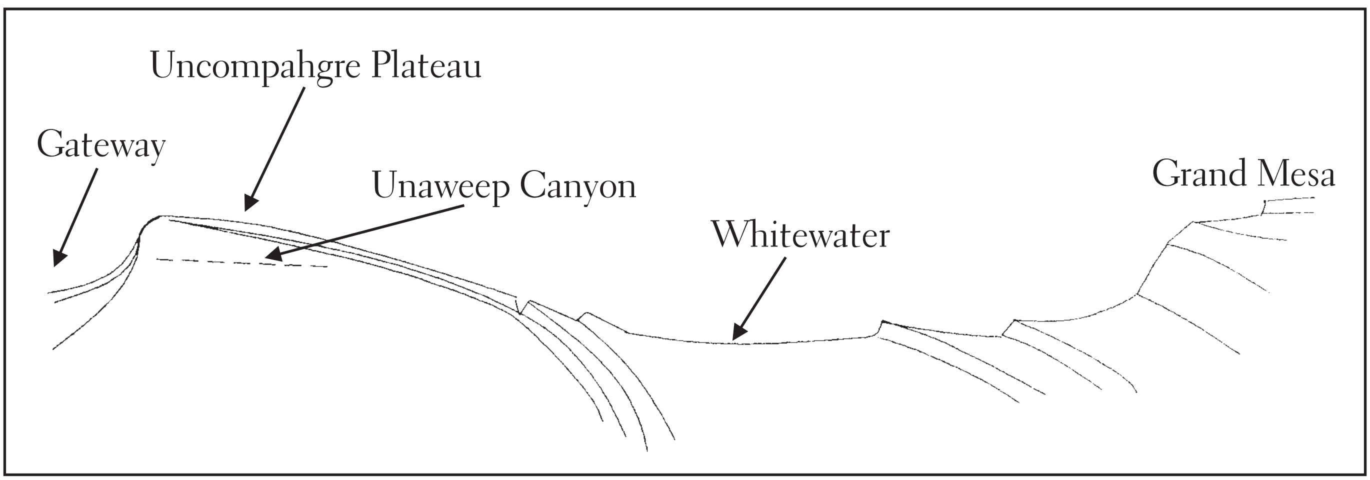

Figure 1: An idealized structure illustration of a cross section from the town of Gateway (on the west, right side of diagram) eastward (right) to the top of Grand Mesa. The dotted line across the Uncompahgre Plateau represents the canyon floor of Unaweep Canyon, intermediate in elevation between the valley bottom and the adjacent crests.

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Table I. Elevation increase near Fruita, Colorado.

Site	Elevation	Distance from Fruita
Fruita	4498 feet	
Grand Junction (Colorado River)	4600 feet	Approximately 15 miles east
Montrose (Uncompahgre River)	5794 feet	Approximately 80 miles southeast
Glenwood Springs (Colorado River)	5760 feet	Approximately 105 miles east northeast

Regional Stratigraphy

Table II shows a generalized geologic column of strata found within this area from Precambrian crystalline rock at the bottom of canyons at Colorado National Monument, through Mesozoic and Cenozoic strata to the top of Grand Mesa about 25 miles east of Colorado National Monument. The stratigraphic units change across the study area as some disappear while others thicken. For example, the prominent cliff former in the park (Wingate Sandstone) is absent just 20 miles away under Grand Mesa. The Green River Formation under Grand Mesa changes from a thin stratigraphic layer to more than 1000 feet thick as it extends to the north. Still, it may help orient the reader.

The rapid deposition of the entire Plateau region, including rock systems seen in Colorado National Monument (Entrada, Kayenta, Wingate, Chinle) was touched upon by Clark (1966):

> Conclusions are (1) sediments were brought in from great distances (2) great sweeps of water instead of local river or flood action were necessary to spread out these sediments over this vast area, and (3) the various formations were laid down one after another in rapid succession.

Creationist articles which deal with some of the rock units in the region are listed in Table III.

The Colorado Plateau in Western Colorado

The origin of the Colorado Plateau is presented in uniformitarian literature as the product of a series of depositional eras which culminate in the gradual uplift and slow erosion of the present topography. In contrast, the Flood Model would propose that the entire Colorado Plateau strata was deposited rapidly in one cataclysm. Evidence favoring this view includes the work of Robert Gentry (Connor, 1977; Gentry, 1986, p. 58) on polonium halos in coalified wood recovered from a number of sites on the Plateau including the Morrison Formation and strata dated Eocene at the top of the local geologic column in the Roan Plateau. By analyzing the compressed halos Gentry produced physical evidence that the Mesozoic and Cenozoic strata were deposited in rapid succession with no time breaks between the strata—during the Flood.

Similarly, there is evidence linking the deposition of Paleozoic strata to those above. That data involves the presence of fossil pollen from advanced plants found in the lowest fossil-bearing rock units (Cambrian), whereas the trees from which the pollen was supposedly derived are found higher in the local and global geologic column (Cretaceous). The initial creationist work was conducted by Clifford Burdick (1966), but due to challenges of the veracity of the work a more painstaking effort was undertaken by Howe, Williams, Matzko, and Lammerts (1988). The latter work duplicated the Burdick results.

Creationists have proposed that entrenched meanders constitute a third evidence for the erosion of the region before complete hardening of the present sandstone (Morris and Wiggert, 1972). River meanders cut deep into hard sandstone are seen in many places in the region. Morris notes that from an engineering standpoint, the entrenching of the rivers is best explained if the rock is not yet hardened or lithified. The meanders in this area are thousands of feet below the mesa and plateau tops described in this paper. The "slow" view therefore necessitates the removal of thousands of feet of overburden before the present canyon walls would be exposed to such erosion, and in a time frame which is short enough to preclude lithification of the rocks. Entrenched meanders in Western Colorado include those near Gateway on the Delores River and on Plateau Creek north of Grand Mesa.

Table II. Regional Stratigraphy of Western Colorado, adapted from Lohman (1965), Prather (1982), and Young (1984)

Uniformitarian term for time periods	Thickness in feet	Rock layers exposed in Grand Mesa-Uncompahgre area
Miocene	100	Basalt cap
Eocene	1000	Green River Formation
Paleocene	1,700	Wasatch Formation
Unconformity		
Late Cretaceous	1,500	Mesa Verde Formation
Late Cretaceous	3,800	Mancos Shale
Late Cretaceous	150	Dakota Formation
Late Cretaceous	60	Burro Canyon Formation
Early Cretaceous	600	Morrison Formation
Late Jurassic	54	Summerville Formation
Late Jurassic	150	Entrada Sandstone
Unconformity inferred		

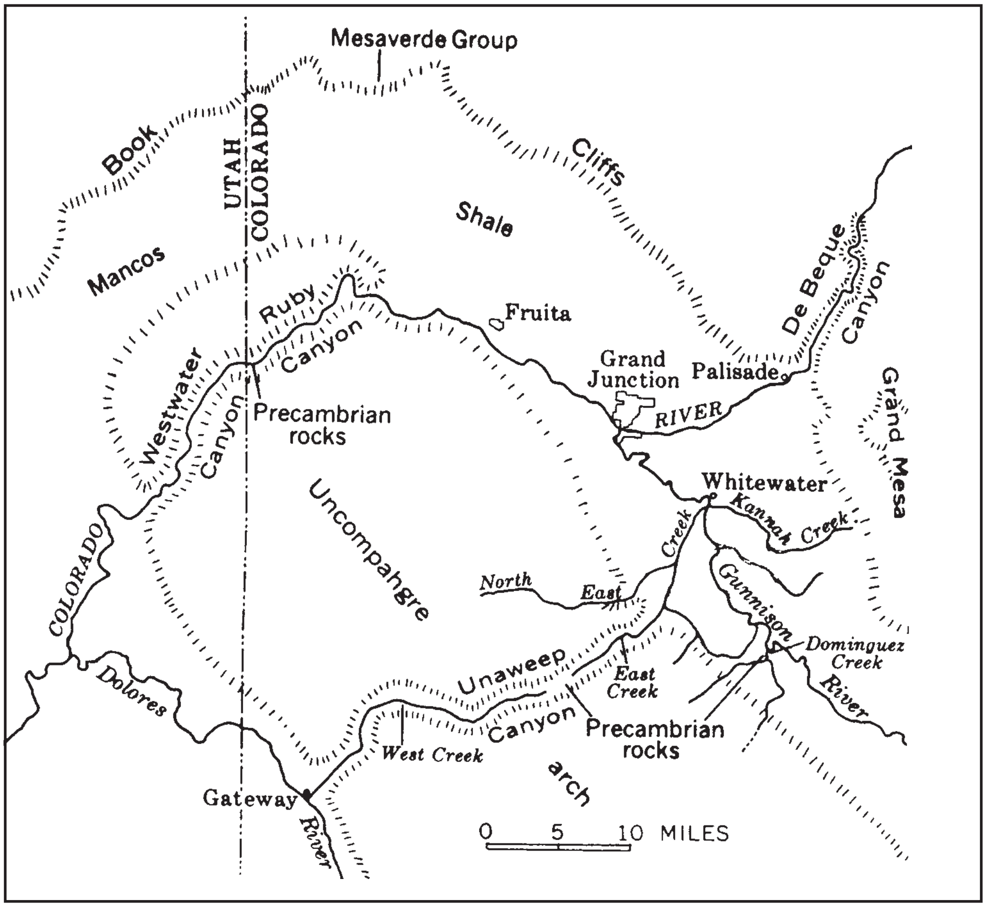

Figure 2. Map of Western Colorado showing geologic features of interest (after USGS, Lohman (1965)).

Holroyd's article on boulder distribution in canyons on the Uncompahgre Plateau argues for a rapid development of the canyons (1994). He noted a lack of "old talus" in the bottom of canyon that he studied. An insufficient amount of talus was noted as a regional phenomena (Holroyd, 1987, 1994).

The Challenge of First Order Features

The challenge to the Flood Model not yet addressed in creationist literature (so far as this author is aware) is the perplexing erosion of the first order of features of this part of the Colorado Plateau. There is a corresponding flat, elevated topography, which is inferred by connecting the tops of Grand Mesa, the Roan Plateau (a maturely dissected plateau at roughly 8500 feet elevation forming the northern horizon from Grand Junction), the crest of the Uncompahgre Plateau (9287 feet), and the Flattops north of Glenwood Springs (elevations over 10,000 feet). Between these levels are the broad Grand and Uncompahgre Valleys at elevations sampled in Table I. These two valleys are continuous and related to the exposure of Mancos Shale, a thick but more easily eroded formation. This valley is narrowest from the crest of the Uncompahgre Plateau to the southwest rim of Grand Mesa (Indian Point) where it is roughly 30 miles across and has a depth of six thousand feet across, below the inferred original surface (see Figure 3).

To imagine the amount of material I presume was eroded, one could consider a conservative calculation. Multiply the 80 miles distance between the towns of Montrose and Fruita, Colorado by the width of the flattest valley bottom (conservatively five miles) and the height of Grand Mesa above the adjacent valley. The number of cubic miles removed from above the flattest part of the valley alone is thus over 400. Grand Mesa is bounded on the south by the drainage of the Gunnison River, which features similar elevations and more inferred material removed. The Grand Valley continues west from Fruita and the valley of the Colorado River continues northeast from the area involved in the calculation. This implies that the amount of material removed must be much more.

If the upwarp of the Uncompahgre Plateau is a post-Flood feature, the amount of material eroded and transported elsewhere since the end of the Flood would be even greater. The flat topography would not be bounded by the width of the valley to the west as in my calculation.

Upriver from the Grand Valley is the valley occupied by the Colorado River between Battlement Mesa's Haystack Mountain (10,978′) and the Roan Plateau. The strata on each side of the valley is relatively flat, hence the valley seems to be erosional (unlike the Uncompahgre Plateau, which features flexed, faulted and dipping sedimentary rock).

Table III. Related Creationist Articles

Geologic formation or member in the Upper Colorado	Related creationist article dealing with the formation
Mancos shale	Froede, 1995
Dakota sandstone	Burdick 1973; Holroyd 1996
Kayenta Formation	Rosnau, Auldaney, Howe, Waisgerber, 1989
Chinle Formation	Chadwick, 1974
Precambrian	Talbott, 1977; Gentry, 1986.

Figure 3: Background: Grand Mesa (horizon) and the Grand-Uncompahgre Valley. Foreground: monocline of Dakota sandstone on the flank of the Uncompahgre Plateau into which the canyon is incised, exposing a cross section. Northwest of Delta, CO

Unaweep Canyon

A river channel presently occupied only by ephemeral streams (Unaweep Canyon, see Figures 2 and 4) exists across the crest of the Uncompahgre Plateau. It is traversed by Highway 141 between the towns of Gateway and Whitewater, in the adjacent valleys. The canyon is remarkably like that of the Black Canyon of the Colorado, only partially filled with alluvium and thus appearing flat-bottomed. Basalt boulders presumed to be from the basalt cap of Grand Mesa have been found on the west side of the valley, indicating that the canyon was a route of the ancestral Colorado or Gunnison Rivers (or retreating Floodwaters) carrying boulders west. The canyon crosses the crest of the plateau at a gentle gradient at 7000 feet elevation, 2500 feet below the plateau crest but thousands of feet above the broad valleys adjacent to the plateau. The pass is so gentle that it is difficult to detect.

Unaweep Canyon is interesting in several regards. It is a site which illustrates the persistence of features from the Paleozoic strata to the present topography by exposing a cross section view of thin sedimentary strata deposited atop the Uncompahgre Plateau. Beneath it the crystalline Precambrian rock forms the canyon walls. A short distance to the west at the town of Gateway the Chinle Formation and Wingate Sandstone are thousands of feet thick (see Figure 5). The difference in depth of Chinle strata is one basis on which an earlier uplift and erosion is postulated, the late Paleozoic "Uncompahgre Highland". That uplift largely parallels the present plateau, a persistence which seems more compatible with a young-earth setting than parallel uplifts hundreds of millions of years apart.

Figure 4: Unaweep Canyon's east entrance, Highway 141 in shadow for scale, showing Precambrian crystalline rock forming cliffs and a veneer of sedimentary rock above

Discussion

The matching tops of the Roan Plateau, Battlement Mesa, and Grand Mesa imply a plain covering the region before erosion. I envision this plain as the Flood-maximum surface. The warping of the Uncompahgre Plateau probably predates the deposition of the uppermost strata of the region. That strata is exposed on the sides of the remarkably flat-topped Grand Mesa and presumably covered most of the

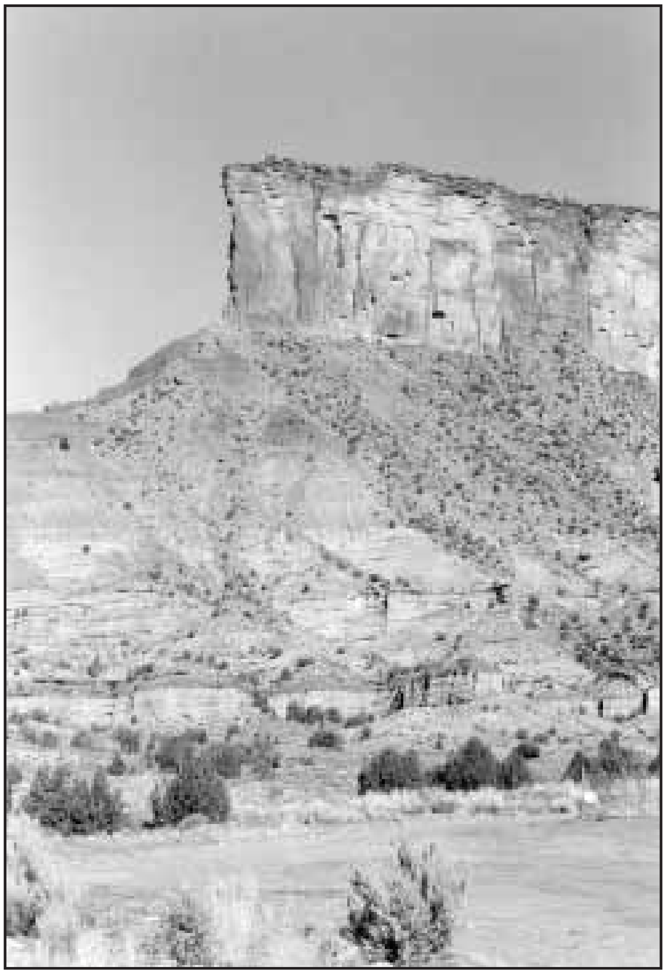

Figure 5: Chinle Formation capped by Wingate sandstone north of Gateway, CO, in contrast to the small veneer of sedimentary rock in Figure 4 and 5 in nearby Unaweep Canyon.

Uncompahgre as well, thin across its top. Such a deep sequence of sediments would imply that the Flood proper deposited strata classified from Miocene to Triassic in this area. Retreating Floodwater would seem adequate to carve such broad valleys if they covered the region to a considerable depth and moved on the surface of the submerged continent with velocity, or if the waters had a source of resupply (e.g. tidal action, tectonic shifting with tsunamis generation, or some other source).

The lack of a well-defined delta downriver in the Colorado River system is conspicuous given the amount of material eroded from these valleys, an echo of the same problem that has been noted for the Grand Canyon downstream. A large river eroding the dendritic canyon system of the Upper Colorado would be expected to leave a huge delta of alluvium at its base level.

The major excavation of the broad valleys may have been completed when secondary processes of cliff sapping, mass wasting, and Ice Age regional catastrophic precipitation produced the dramatic cliffs, entrenched meanders, and stream superposition features for which the region is famous (such as Colorado National Monument and the Black Canyon of the Gunnison National Monument). The relatively flat top of Grand Mesa implies that deformation of the crust so as to exaggerate the topographic relief was small. The broad valleys appear to be erosional features. Unlike the Mississippi Valley, floods associated with continental glacial phenomena do not seem plausible here based on current (but perhaps inadequate) understanding of the geographic limits of glaciation (Mehlert, 1988). Further research is necessary to determine how the Ice Age affected the region for the purpose of this model.

Prior authors have proposed that regional lakes in the post-Flood era might have drained catastrophically and resulted in the rapid erosion of the Grand Canyon (Austin, 1994; Williams, Meyer, and Wolfrom, 1992). One of the proposed lakes occupies the Grand Valley up to the foot of Grand Mesa. But this valley is itself a major erosional feature! The erosion of the Grand Canyon might therefore be in part due to an earlier and larger amount of water needed to erode the master valleys of the upper Colorado in which the proposed Canyonland Lake would lie.

Sources for the amounts of water necessary to transport material on such a scale include surges of Flood waters from the east prior to the rise of the Colorado Rockies, perhaps related to giant gyres associated with continental flooding in recent computer modeling (Baumgardner and Barnette, 1994). It is noted that the top of Grand Mesa preserves what is thought to be a broad valley which filled with basalt. That basalt is thickest to the east, where it is now highest. The valley which the basalt filled is therefore thought to have drained east rather than west at the time of the basalt flows. If so, perhaps the present slope of the Mesa top to the west is due to the post-Flood deposition uplift of the Rockies to the east after erosion and transportation of material from the master valleys had commenced.

The suggestion that Mancos Shale (Late Cretaceous) is a "retreating Floodwater" deposit (Froede, 1995) would require that the strata above the Mancos (hence, after the Mancos) in this locale be deposited in the post-Flood era and then eroded back to the present valleys in post-Flood regional catastrophism. This seems difficult in a young earth framework due to the extent and depth of the strata and need for Flood waters as a potential mechanism for cataclysmic mass wasting.

Some have suggested that the Mesozoic-Cenozoic boundary as a Flood-post-Flood boundary. The scale of deposition and erosion argues in favor of the strata in this area being Flood strata, concluding with the mid-Cenozoic basalt caps of Grand Mesa, Battlement Mesa, and the Flattops. If not, the mechanics of river erosion on this scale in a short chronology seems difficult. The wide Grand Valley north of Westwater Canyon, where the present river does not go, is a case in point.

I propose that the large valleys (Grand Valley, Uncompahgre Valley) resulted from the retreating Flood water. The "smaller" canyons (Ruby and Westwater Canyons, the Black Canyon of the Gunnison, entrenched meanders, the cliffs at Colorado National Monument and related canyons such as

Bangs Canyon) are the result of post-Flood ice-age erosion, mass wasting and cliff sapping (Williams, 1995; Froede, 1996.) on a catastrophic rather than cataclysmic scale. Incomplete lithification of strata and abundant ice-age moisture would contribute to the rapid formation of these canyons systems.

Outstanding Issues Remaining

With Canyon Formation

Unaweep Canyon straddles the Uncompahgre Plateau at an elevation (6973 feet) intermediate between the crest of the Uncompahgre Plateau (9399 feet) and the trough of the Grand Valley (Whiterwater, 4660 feet). The Canyon is eroded deep into crystalline rock, making incomplete lithification unavailable as a way to accelerate erosion rates (see Figure 6). Unaweep Canyon appears to be an example of stream superposition and finally abandonment of the channel in favor of the present route of the Colorado and Gunnison Rivers across softer shale to the north. If a river carved the initial 2500 feet of Unaweep Canyon into crystalline rock, then rivers carving the adjacent broad valleys to lower elevations than Unaweep Canyon (roughly 2500 feet) imply a time interval. If retreating Flood water carved the broad Grand Valley, what carved the Unaweep Canyon at an elevation intermediate between plateau crest and valley bottom?

Figure 6: Unaweep Canyon from the Highway 141, near the pass. Note the thin layer of sedimentary rocks forming a distinct layer atop the crystalline basement rocks forming the cliff face.

One possible solution is that the canyon is a product of bottom currents which moved along the top of the submerged continental surface. However, these would not likely reach speeds capable of producing cavitation and thus accelerate erosion of crystalline rock in so narrow a channel. Present outer continental shelf canyons may be compared, but the time available for canyon development would be measured in years to centuries.

Another possible solution is that the Flood waters which drained from the continents occurred in more than one episode, with interludes of catastrophic river action between re-invasion and re-drainage by Flood waters (or, uplift and re-subsidence or the region). If so, Unaweep Canyon is river-carved during an interlude in the Flood, yet the still-lower Grand Valley is the product of subsiquent Flood water drainage.

A support for the later scenario is the riverless lower Grand Valley, which is wide north of the present temporary base level of the Colorado River in the crystalline rocks at the northern end of the Uncompahgre Plateau (Westwater Canyon). This wide valley would need to be eroded by mass wasting and numerous small streams in the post-Flood era unless cataclysmic processes are invoked. Cataclysmic processes would involve the Flood propor, unless a post-flood agent is conceived. This is thousands of feet lower than Unaweep Canyon.

Both the uniformitarian and Flood models have outstanding issues remaining. Models are not falsified by challenges, but challenges may point to areas of needed revision and improve the models. This area presents a difficulty to Flood geology. I hope that contemplating this problem might unlock other areas in the Rocky Mountain West which have stream superposition problems and immense topographic relief. I also hope that other creationists will consider the problem of the broad valleys noted here, as well as Unaweep Canyon. It is a fascinating area to study.

Acknowledgments

I thank the reviewers for helpful suggestions to improve the readability of the manuscript and the editor for encouragement in persevering in the attempt to write the article. Thanks to Rick Fleharty of Montrose, who drew Figure 1 via computer, and to my wife for allowing my inattention to other duties.

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A Message from the Managing Editor

Lane P. Lester

The members of the Creation Research Society board of directors are "working directors;" they all pitch in to further the work of the Society. One of the jobs to be done is that of managing editor of the *Creation Research Society Quarterly*. The title of "managing editor" means different things for different publications, but for the *CRSQ* it means the person who takes the final edited manuscripts and illustrations and combines them into the published magazine.

For the past four years, Dr. George Howe has served as the managing editor of the *CRSQ*. He has decided to pass that responsibility along, and he recommended that I be his successor. Whether he did me a favor remains to be seen, as does the question of whether he did the Society a favor as well.

George's approach to editorial layout has been to do his cutting and pasting with real scissors and glue. The only muscle activity in my technique involves pressing computer keys and moving a mouse. For those interested in computerized publishing, this issue of the *CRSQ* was composed in Corel Ventura. The output file was used to generate the photographic film from which the press plates were made.

By way of a disclaimer I should say that, although I have published a few biology textbooks, this is my first experience with a scientific journal. The changes I have made have been for one of two reasons, either to make the *CRSQ* as readable as possible, or just because I like the way it looks. That is one of the advantages of volunteer labor: no one is likely to be very critical of your work.