# JOURNAL

*of the*

# AMERICAN SCIENTIFIC AFFILIATION

*The fear of the Lord is the beginning of wisdom. Psalm 111:10*

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The Fifth Annual Convention will be held at Goshen College, Goshen, Indiana, August 29 to September 1, 1950

General Chairman--

Dr. Harold Hartzler
Goshen College
Goshen, Indiana

## Accommodations

Rooms for convention guests will be provided in the college dormitories and meals will be served in the college dining hall. These will be at reasonable college rates.

## Committee on Arrangements

Dr. Paul Bender
and
Dr. Alta Schrock
Goshen College
Goshen, Indiana

* * *

The one elected to be Vice-President for 1950 was Dr. R. J. Voskuyl.

# CHRISTIAN APOLOGETICS

The Editor has never taken a course in apologetics and assumes that a substantial percentage of the membership of The American Scientific Affiliation are in a similar uninformed condition. In keeping with the assumption indicated he is waxing bold enough to offer this limited treatment of the subject: Christian Apologetics.

Classically (according to the Encyclopedia Brittanica, Vol. 2, p. 114) "Apologetics seeks to establish grounds for faith in God, in Christ, in the Bible and in the Church. . . ." "Again the basis of apologetics may be placed in reason or in conscience or in experience, or (in some) sense in authority -- or in a combination of several factors. . . ." It would appear that an apologetic could be built up that would fit the above point of view and still be lacking in any dynamic, Christian element. It seems in order, therefore, to speak of Christian Apologetics or a Christian apologetic, to indicate its nature, its application and its purpose.

A Christian apologetic is essentially a demonstration of the consistency, or harmony of the various parts of a single continued authoritative revelation. We assume that God has revealed Himself in part in Nature and more personally and completely in the Scriptures; we may even consider that He has revealed Himself in part in the Church Universal. In point of time or understanding these are parts of a continuous authoritative revelation. Primarily the objective of a Christian apologetic is to show the consistency or harmony of our knowledge of Nature (or what passes for such) and God's authoritative revelation -- the Scriptures. In so doing we need not consider as science or knowledge of Nature all of man's worn or outworn theories and speculations, neither need we become "Bibliolaters" by considering the Scriptures as God's authoritative Word and rejecting the claim that "the Scriptures contain the Word of God."

Obviously a detailed knowledge both of the Scriptures and some phase of Natural Science are involved, yet an extensive knowledge of either separately is not enough; the essential element of apologetic as employed here is a relationship, i.e., harmony or consistency -- thus the relationship of any phase of natural science to the Scriptures must be demonstrated in the true apologetic. A detailed elucidation of either aspect, however entertaining, however enlightening and however learned is not an apologetic.

In applying this idea to the publications of the A.S.A. one finds many times an unbalanced condition arising from a neglect by the authors of one or the other aspects of the effort. Natural science is overemphasized in some cases, whereas in others efforts are made to derive all or at least spectacular parts of Natural science from the Bible. In some cases the evangelical note is omitted, muted, or appended as something of a discord at the end. The true Christian apologetic should demonstrate a relationship between an elucidation of some phase of Natural science and an illumination of some part of the Scriptures and should have a well integrated evangelical theme running throughout.

Finally we come, in elaboration of the above, to the real purpose of a Christian apologetic. Some have considered that the latter is justified by its intellectual beauty, its consistency and its completeness. Its ultimate purpose is thus to be integrated into a well constructed, self-contained cosmology. We are inclined to believe that cosmo- is justified only of its relative soteriology and not of itself alone. Thus we consider that a Christian apologetic must have for its purpose the establishing or the strengthening of a real saving faith in God's Word, the Sriptures and in His Logos Christ Jesus our Lord.

M. D. Barnes

Comment on the "Deluge Geology"
Paper of J.L. Kulp

By an A.S.A. Member.

In an earlier letter I had stated that I wished to say more about the discussions on geology at our Los Angeles meetings. I feel that this is a very critical area for our consideration both because it is a very critical area for our consideration both because it is an important area and because very little is being done in this area by those who have the Biblical viewpoint. I am very happy that Dr. Kulp is working in this area and I appreciate very much his Christian spirit and his scientific approach. I am inclined to think that he may still be too much influenced in his own thinking by the orthodox geological viewpoint with which he has been associated and which, of course, is the only scientific viewpoint which has had systematic development. I feel also that Miss Erdman is perhaps too much committed to the orthodox viewpoint.

To be more specific regarding Dr. Kulp's paper on the deluge geology, I should like to make a few comments. In my mind the paper seemed to lack something of the scientific approach in that it began with the viewpoint that Dr. Price's flood geology is all wrong and that his ideas are not worth considering. The rest of the paper was then a presentation of arguments against the flood geology concept. Even though one would grant that this conclusion, that the flood geology concept is all wrong, is correct, the method of the paper seemed to be inadvisable inasmuch as this was definitely considered to be a disputed issue on which we wished to have some light. At least for my own thinking I would have appreciated much more if he had presented facts and arguments on their own merit and drawn his conclusions at the end of the paper on the basis of these arguments rather than to have used the paper merely to bolster his pre-determined conclusions. Personally I hold no brief for the flood geology concept as presented by Dr. Price because I do not feel that I am informed enough to pass judgment on many of these issues. I do feel strongly, however, that the members of the ASA are competent to understand the facts and the issues involved and that they deserve a clear presentation of these facts from which they can then themselves draw conclusions. I do not think that the issue is too clear in the minds of many of the members of the ASA. I would welcome continued presentation of facts and discussion of the problem. Let me say again that I appreciate very much the efforts of Dr. Kulp and I believe that the affiliation should continue to foster his efforts in this direction. I hope that some other good scientists may be inspired to contribute also to this problem.

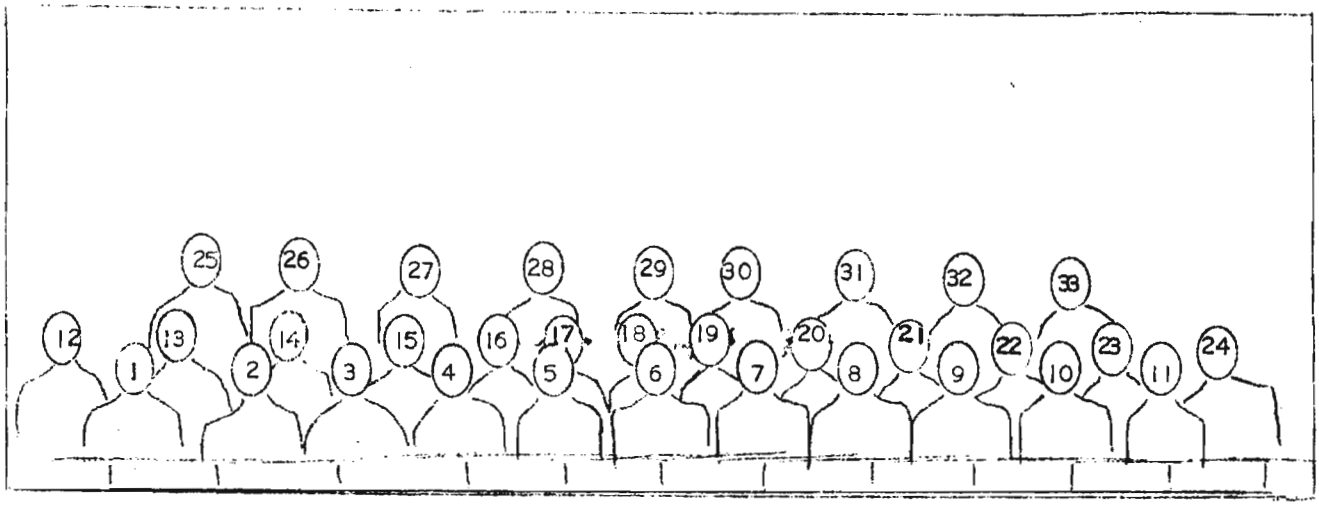
I do not know whether my presentation of my feelings on this point in this way can effect any good, but I am hoping that by airing my views there may be some influence brought to bear on the future program and efforts along this line.

Incidentally, I am wondering whether you had noticed on the inside front cover on a recent Scientific Digest a statement regarding the age of the fossil remains of one of the prehistoric human forms. This is very interesting in that it places the remains definitely into the inter-glacial period, if I remember correctly, rather than at a much earlier time, as has usually been considered. I believe there are new techniques being developed for the dating of these things which should be pursued as vigorously as possible in trying to dissolve some of the discrepancies that now exist between the orthodox geological view and a Biblical view.

PHOTOGRAPHS OF LOS ANGELES CONVENTION
AUGUST 22 – 26, 1949

A.S.A. GROUP AT PALOMAR

A.S.A. GROUP LEAVING PALOMAR

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*ASA MEMBERS

DRS. MACRAE, VOSKUYL, MONSMA, B.P. SUTHERLAND, PRESIDENT EVEREST AND RECONSTRUCTION OF GROUND SLOTH FROM LABREA TAR PITS. LOS ANGELES.

LECTURE AT LA BREA TAR PITS TO A.S.A. MEMBERS.

# NEW LIGHT ON THE OLD TESTAMENT

Allan A. McRae
President, Faith Theological Seminary
Wilmington, Delaware

I would like to read the last three verses of the first chapter of I Peter. "Being born again, not of corruptible seed but of incorruptible, by the Word of God which lives and abides forever. For all flesh is as grass and all the glory of man as the flower of grass. The grass withers, the flower thereof falls away; but the Word of the Lord endureth forever. And this is the word which by the gospel is preached unto you."

About twenty years ago, I attended a series of meetings about two blocks from this spot. It was an Association, but quite different from the one whose meetings I am attending now. It was announced that the purpose of the meeting was to bring together science, education, and religion and that the leaders in all three of these fields would be present in order that we could bring together the material from these fields and to give us the best of all of them. I remember that for religion they had the Fiske Jubilee Singers there, and their singing was indeed beautiful. But it was rather comical sometimes to see how what they considered the best in science and the best in religion seemed to clash. Thus they would have science represented by a man who would speak and who would tell us that Jesus Christ was born just like anyone else; He never knew anything but what He learned at school; His death had no more meaning than that of any other one who was executed, and when He died that was the end. After these men representing science gave us these which he presented as scientific facts, the Fiske Jubilee Singers got up and they sang, "It's The Old-Time Religion, It's The Old-Time Religion, It's The Old-Time Religion and It's Good Enough For Me." Then I remember another speaker who told us that this old-fashioned idea of trying to save people individually was out of date. He said that we would never make a better world that way; we must go out and we must improve conditions and we must fix up social things and improve race relations and do away with war and all that, and thus we would build a great, wonderful, new world. When he got through, the Singers came forward and they sang, "Keep A Inching Along, Keep A Inching Along, Jesus Will Come Someday." Then a third speaker told how the old out-of-date idea was to be talking always about the future life. We don't know whether there's any future life, he said. All we've got is what's in this life; we must do what's the best we can while we're here. Then when he finished, the singers rose and sang, "I'se Got A Mansion In De Sky - I'se Got a Mansion In De Sky." And as I heard that and saw the clash there, I realized the idea which was in the minds of the organizer of that conference. Here they had, they thought, science giving us these facts; here they had education showing us these tendencies in which we should move forward into a better world. And then, to satisfy our religious emotions, they would sing these old-fashioned songs. And thus they put facts and they put thoughts over on this side with their ideas which they thought they had worked out which they felt pointed the way of progress in the world and over on the other side they put the old-fashioned songs which they thought would represent the emotions of ideas now given up. And that is an idea that is very common in the world - that religion is a matter of emotion of singing some beautiful words and it doesn't matter particularly what they mean; that it is not something that has a relation to basic, substantial, solid fact. Now, of course, it is true that knowledge alone will never save a person. You will never save a person's soul by argument. In fact, you can't save a person's soul. The Holy Spirit must enter into the heart, and thus convict him of sin and show him his need of a Saviour. And that man may be utterly ignorant, he may have no background, he may have no training, he may have little knowledge. But if he looks in faith to the Lord Jesus Christ as Saviour, he can be saved and put on the road to everlasting life and far better off than the most learned man in the world without the knowledge of Jesus Christ. But it is a fact that education is increasing in our country, and it is a splendid fact. Our country is going forward and knowledge in

improving our understanding of technical things is constantly being made better; and if the idea is accepted that religion is simply something for the backward and for the ignorant and that the person who knows doesn't believe these old-fashioned ideas, only an unexpected and sudden miracle of the Spirit of God can keep our nation from falling into utter heathenism and darkness. Let no one think that this is impossible. Other nations have been just as Christian as the United States ever was and have relapsed into heathenism, into wickedness, into idolatry. It has happened over and over again in the history of the world and it can happen here. All things are in God's hands and God controls, but God gives Christians a work to do; and the members of the American Scientific Affiliation believe that one of the tasks which God has placed in the hands of Christian people to do and one of the most important tasks which they can do; not a task for every Christian to do but a task for many to do; is the task of studying the facts of science and the facts of history and seeing what the true situation is in regard to the relationship between these facts and the Bible. I do not believe that we serve the Lord by going at it and saying now here is the Bible, let me glance at it and pick three or four words out of it, this is God's truth, now let's twist everything of science in to make it fit with it. That is not honoring to the Lord. What the Lord wants is for us to study the Bible, to get down to its exact definite statements, to see what it means in the original language and find exactly what He has taught; and He wants us to study the facts of science of geology, of history, of botony, of archaeology, or whatever it be; and He wants us to study those facts and to see how the two fit together. And if we diligently and honestly study those matters we will find that they fit together, because God who controls all things is the Author of the Word of God; and the two rightly understood must fit together. Therefore if America is to be kept from sliding into heathenism and utter wickedness and be utterly abandoned of God, if our Lord should tarry. If this is not to happen, one of the tasks facing the Christian world today is to study these matters and to show that it is reasonable to believe in the Bible; that it is not something only for the ignorant, but that it is something which the wisest man in the world can believe with a full relationship to his scientific understanding. Now, that is one of the great convictions which was in my heart, and those of the others who founded Faith Theological Seminary in 1937. And we have been trying to train men who would carry out a portion of this work there at the Seminary. And having had this conviction and this ideal with us for sometime before the founding of the American Scientific Affiliation, I was very glad of the opportunity to do what I can to help advance this work on the part of the American Scientific Affiliation. The work of showing that it is intellectually respectable to believe the Bible; that it is really the most reasonable thing we can do and that it is unreasonable to deny the statements of the Word of God. Now this evening, I am going to look with you at a few of the facts which I have gleaned in my study of archaeology in relation to the Bible, and I am going to show you a few instances in which we see how the facts of history, the facts of archaeology, as we get them and understand them prove not to disagree with the statements of the Word of God, but to be in absolute agreement with those statements of the Word of God. About a century and a half ago, there began a movement which we call "The Higher Criticism;" a movement of denying the truth of the statements of the Scripture and working up very clever and ingenious theory as to the methods by which these books came into existence. And those theories of the "Higher Criticism" were theories which could easily be developed a century and a half ago, because very little was known about ancient times then, except what we have in the Bible. We had no other source of knowledge back of 500 B. C., one hundred and fifty years ago. During the past hundred and fifty years, as a result of archaeology this situation has completely changed. Today, ancient history runs just as far back of 500 B. C. as modern history comes this side of 500 B. C. You see my field of study is ancient history; the field related to the Old Testament. So I think of modern history as starting in 500 B. C. And the Ancient history goes just as far back of that; now it goes back to 3,000 B. C., as a result of archaeological discoveries. And that's as far back as it can ever go, because writing began at 3,000 B. C., approximately. And you

can't have history before you have writings. Before that you have _____ history. You find remains of buildings, you find some skeletons, you find some signs of where people have lived and you make a guess as to how long people lived there. And you say, well this must have taken 500 years and this must have taken 800 years; well that's your guess and it's no better than the next person's guess. You cannot have exact dates until you have writing and that is only since 3,000 B. C. If you pick up a high school textbook of ten years ago, you are quite sure to find in it a statement like this; I have in mind Breasted's "Ancient Times," which was very widely used as a high school textbook a few years ago. And I remember it had this statement in it - that the year 4241 B. C. is the earliest fixed date in history because that is the date in which the Egyptians invented their calendar. For all I know, they may still be printing that in high school textbooks, because Breasted was one of our greatest scholars of ancient Egyptian history and culture. But, today, there is not a scholar of Egyptian, of any standing whatever who believes that the Egyptians had a calendar as early as 4241 B. C. I doubt if there's one who thinks they had it prior to 2700 B. C. I am sure none think they had it before 3,000 B. C., because how could you have a calendar without writing. If you couldn't write down your calendar it would be pretty difficult to have a calendar. That was a theory, one of the many theories that have been advanced and dogmatically presented; that have been proven to be utterly falacious. But in the meantime it has been printed in high school textbooks and people have read it and then they've turned to the Bible and read in the margin that man was created in 4004 B. C., and they've said the Bible must be wrong, because 200 years before man was created the Egyptians actually had a calendar. And thus the faith of many has been injured. And the fact of the matter, of course, is that both statements are false. Neither did the Egyptians invent their calendar in 4241 B. C., nor was man created in 4004 B. C.; both statements are false. One is a false inference from the fact of archaeology and the other false inference from the statements of the Old Testament. Doubtless the creation of man was long prior to 4,004 B. C., as I think any careful study of the Old Testament will demonstrate. But there is nothing in archaeology to prove it impossible that we might have been created in 4,004 B. C., as far as archaeology is concerned, because we have no history back of 3,000 B. C., and while it is likely that the material remains we have to go back three or four thousand years back of that, you cannot tell just how long material remains of that type go. And in the Old Testament we have accounts of events running back hundreds of years back of that time. We have great cities described in the Old Testament, cities which were absolutely unknown to us otherwise. We had great conquerors mentioned in the Old Testament absolutely unknown to us otherwise. Whole nations were mentioned in the Old Testament which otherwise were completely unknown. And it was simple enough for people then simply to say, well it isn't so - I don't believe it. No one who knows the facts can say that anymore, because at point after point, the statements of the Old Testament have been marvelously verified by archaeological discoveries. Now this one I just referred to, the case of a whole nation, is a very interesting instance. It is a nation known as the Hittites. We have other nations, but this is the most outstanding instance, perhaps. You know that the Hittites are mentioned in Genesis where Abraham purchased a burial place for his wife from two of the sons of Heth. They are mentioned in Exodus where God promised that He would drive them out from Palestine to make room for the Israelites. They are mentioned along in II Samuel where we find that David had a mercenary soldier in his army, Uriah the Hittite. But the most striking reference to the Hittites is one which is much less familiar than any of these; it is found in II Kings, the 7th Chapter and the 6th verse. And there we read in II Kings 7:6, "for the Lord had made the host of the Syrians to hear a noise of chariots, and a noise of horses, even a noise of a great host; and they said one to another, Lo, the king of Israel hath hired against us the kings of the Hittites, and the kings of the Egyptians, to come upon us." And it was as recently as 1904 that ridicule was piled upon this verse. A British scholar, in a private conversation in 1904, made the statement that he did not believe that such a people as the Hittites ever actually existed. But, he said, if it should be proven that there actually was such a people as the Hittites, I am sure we will find that they were only a small

and a very unimportant tribe of people. And he said to speak as this verse does of the Hittites and Egyptians in the same category is as if one were to speak of a treaty of alliance between the British Empire and the Cherokee Indians. That's the way it looked to this British scholar in 1904. And then just two years later, in 1906, Professor Hugo Winckler of the University of Berlin went to _____ in Asia Minor and excavated it. And there excavating in that town in Asia Minor, he found there buried under the soil, remains of the great capital of the ancient Hittites. And there he found many acres of the foundations of palaces and temples and, best of all, he found the archives of the Hittite empire. And in these archives he found the proof that the Hittites were a great nation which could write on equal terms with the Egyptians and the Babylonians. In fact, at one time, they actually captured and plundered the city of Babylon. He found that the Hittites and the Egyptians fought each other for one hundred and fifty years, back and forth, up and down through Syria and Palestine, and after one hundred and fifty years of intermittent war they reached a point where they decided that neither one of them could conquer the other. And so they decided to call it off and they made a treaty of friendship. And then after this treaty was made the king of the Hittites went to Egypt and traveled with Pharoah of Egypt up and down through the land of Egypt and each of them called the other, "my brother;" and in this treaty we have the earliest extradition clause that is known in history. Today, instead of anybody doubting the existence of the ancient Hittites, today we have scholars in Germany, France, England, and America who are giving their whole time to the study of the language and the history and the culture of the ancient Hittites. Recently there have been two professors of Hittite in Yale University alone. One of them has recently retired and I do not believe he has yet been replaced. But, Hittite, the Hittites thus, who before 1904 were just a name in the Bible and otherwise seemed to have no existence, have now been proven to have been actually one of the greatest powers in the world's history; and the memory of their glory and fame was kept alive only by a few references in the Bible. What a wonderful illustration of the passage with which we began this evening; "all flesh is as grass and the glory of man as the flower of grass. The grass withers and the flower thereof falls away; but the Word of the Lord endureth forever."

It is interesting to go through the Bible and to find many instances of individuals, of nations, of cities, all sorts of things mentioned in the Bible and evidence of them found from archaeological discoveries. This is very interesting, but I think that even more striking is to take instances in which you have the background of the Biblical story evidenced by some archaeological discovery, showing that the Biblical story shows a knowledge which must have been from someone who was right there on the spot and knew the facts as they happened, and thus giving us an evidence that the Bible was written at the time it claims to be and not as many centuries later as the higher critics maintain. I think these instances where the background was not previously familiar are among the most interesting. I'd like to call your attention to a story in the book of Genesis which is a very fine story to tell in Sunday School so long as you tell it here in America. It's the story in Genesis 13, familar to everyone who has ever attended Sunday School. You'll remember in that story, it's when Abraham and Lot came up out of Egypt and they both of them were very wealthy and you remember they came up there from Egypt into Palestine and there they began to have difficulty; because each of them had so many flocks and herds. You remember that it probably went something like this: One morning, Abraham's men came out as was their custom at 5:30 in the morning and took out their flocks and their herds and began to take them out to find pasture and they found that all the good pasture land was taken. Lot's men had gone out at 5:00 that morning. And here all the good pasture land was taken and they had to go along over that hill country there for miles to get to good pasture land that was not already taken. And so the next day they got up at 4:30 and they got out half an hour before Lot's men and they took the good pasture land and Lot's men had to go further. And so, the next morning I suppose that Lot's men came out at 4:00 and got ahead of Abraham's men. And pretty soon they'd have been going out before they went to bed at night; and they couldn't do that and so they started fighting. And it

looked as if there was going to be a real clash between them. And then Abraham went to Lot's tent and he said we must put an end to this; and we read in verse 8 that Abraham said to Lot, "Let there be no strife between thee and me and between my herdsmen and thy herdsmen; we are brothers. Is not the whole land before thee; separate thyself I pray thee from me. If thou wilt take the left hand then I will go to the right. Or if thou depart to the right hand then I will go to the left." And Lot lifted up his eyes and beheld all the plain of Jordan that it was well-watered everywhere before the Lord destroyed Sodom and Gomorrah, even as the garden of the Lord, like the land of Egypt as thou comest unto Zoar." "Then Lot chose him all the plain of Jordon; and Lot journeyed East; and they separated themselves the one from the other." And this story has been told over and over in Sunday Schools, to show the wonderful unselfishness of Abraham and the selfishness of Lot; and it's a wonderful story to tell for that purpose in Sunday School, provided you tell it in America and not in Palestine. But the trouble is if you go to Palestine, if you go as I did in 1929 and you stand at the place where this happened, there between Bethel and Hai, upon that hill country of Palestine, and you stand there and you imagine Abraham and Lot walking along there and you look at this hill country where Abraham stayed, you would see a shepherd coming along blowing on his little pipe and behind him there come the great flocks of sheep and goats and they're following him and he's leading them out and here's all the fine pasture land and the good springs and it's a wonderfully attractive picture; all that lovely hill country up there of Palestine where Abraham stayed. And then you look over at the Jordan valley that Lot chose and look over and you look down there forty-five hundred feet down to sea level, another twelve hundred feet down to the Jordon valley, way down there, hot and dry and desolate. And in the midst of that hot, dry, desolate desert valley, there is a muddy stream winding down in the middle. And you look down at that barren section down there and you think what a fool Lot was to choose that, why on earth did he ever go down there. And the story just doesn't seem to fit, it doesn't seem to make any sense at all when you read it over there in Palestine today. And according to the higher critics, this story was written centuries after the time of Abraham and at that time a person standing there would have seen exactly what you see there today. And he would think what on earth did Lot ever choose that territory for, to go down there. But you notice that it says that he beheld the plain of Jordan, that it was well-watered everywhere, before the Lord destroyed Sodom and Gomorrah. He doesn't say that it's kept on so - it wasn't even so when Moses wrote. But he says it was so before the Lord destroyed Sodom and Gomorrah. "Even as the garden of the Lord, like the land of Egypt as thou comest unto Zoar." If you look in the Encyclopedia Brittannica for articles on ancient civilization, you'll find a good many of them are written by Eduard Meyer. Eduard Meyer was a great German historian of ancient history, perhaps the greatest historian of ancient history who ever lived. And Eduard Meyer as recently as 1928, shortly before his death, declared that the Jordan Valley was never used with irrigation and development of the soil as is done in Egypt under almost identical circumstances; but always was a barren and desolate valley. But Eduard Meyer, the last three or four years of his life was getting pretty elderly and he wasn't keeping up with archaeological developments as he had during all previous parts of his life. Today, no one who is familiar with facts of archaeology would make that statement because as early as 1924, we began to discover facts we hadn't previously known about the Jordan Valley. And in 1929, when I was on the expedition of the American Schools of Oriental Research, down through that Jordan Valley, we carried further those discoveries and we found that down in that Jordan Valley there are between forty and fifty hills which, when you examine them prove not to be hills at all - that is, not natural hills. But they're artificial hills. They are hills in which the remains of an ancient town is buried. There are forty or fifty of them in the Jordan Valley. And you can't have forty or fifty towns in a valley like that unless you have plenty of irrigation and large crops growing and a fertile area to support it. And examining the materials from those towns, it is found that almost without exception, what we find from them comes from the time of Abraham and before. I remember at the Southern end of the Sea of Galilee seeing one which runs for over half a mile along the Southern

edge of that sea and there is the debris and remains of that town piled up high t here at the Southern end of the Sea of Galilee. And it begins at about 3,000 B. C., and it goes up to about 1800 B. C., and then it stops; and no more civilization at that place after about 1800 B. C. And from the time of Abraham on, the towns decrease and decrease until by the time of the coming of the Israelites, Jericho was about the only one left down there. As they disappeared, the area became a desolate wilderness, after that which began with the destruction of Sodom and Gomorrah. And in all subsequent times, people just couldn't have imagined that as an attractive section which Lot would have chosen to go down to.

One of the books that the higher critics are most sure is not genuine is the book of Daniel. This book of Daniel is a book which the destructive critics, without exception, say was not written at the time of Daniel, about 550 B. C., but they say that it was written at about 168 B. C., the time of the Maccabees. And they claim that it has many historical inaccuracies in it. And in archaeological discoveries, at one point and another, we have found increasing evidence, not of inaccura y but of the accuracies of the statements of the Book of Daniel. But there is one very interesting place which, at first sight, appears to be an inaccuracy and a very striking one. That is in connection with the fifth chapter of the Book of Daniel. You remember that in that fifth chapter we have the story of Belshazzar and his feast. And in that story we read how Belshazzar gave this great feast and at the feast he was troubled because a hand came out and wrote some words on the wall. And he called for somebody to tell him what it meant, and nobody could tell him. And he said if anyone will tell me what it means, I will make him the third ruler in the kingdom. And finally somebody told him about Daniel, and they called Daniel, and Daniel told him what it meant. And then we read that Belshazzar commanded and they clothed Daniel with scarlet and put a chain of gold about his neck and made a proclamation concerning him that he should be the third ruler in the kingdom. In that night was Belshazzar, the king of the Chaldeans slain. That's what we read here about the downfall of the Babylonian Empire. Was that written in the time of Daniel, or was it written, as the higher critics say, four hundred years later? Well, we began making discoveries in Babylon. We began finding ancient writings there telling us of the history of that city. And pretty soon we found accounts of various kings and we found the story of the last king of Babylon and his name was Nabonidus. Now that doesn't sound a bit like Belshazzar, does it? His name was Nabonidus. And then we found that Nabonidus, after the Persians conquered Babylon, was not killed, but that he was given a pension and he lived out the rest of his life in happiness and devoted himself to the study of archaeology. That seems to be a favorite occupation of emperors after their lands have been conquered. And you remember Kaiser Wilhelm of Germany, after 1918, did the same thing - he retired to Holland and devoted himself to the study of archaeology and wrote one or two books on the subject. But, Nabonidus was not killed, but devoted the rest of his life to this study. Well, that contradicts the Bible doesn't it? The Bible says that it was Belshazzar. The tablets say it was Nabonidus. The Bible says Belshazzar was killed; the tablets say that Nabonidus was not killed, but was allowed to live on and given a pension. Well now, what're the facts? If this was written at that very time, how could they get the facts so twisted. But if this was written four hundred years later when the Maccabees were fighting for their lives against the Syrian oppressors and somebody wanted to write something to encourage the people to fight valiantly against the Syrians, then it's perfectly simple that he could have gotten the thing mixed up and just gotten the king's name wrong and gotten the facts wrong about his having been killed and just got the story a little bit mixed. For after all, it points a good moral; it helps you to encourage people to fight valiantly to imagine things that might have happened in the past; that's the critical interpretation of it. And if you got the names wrong and the facts wrong, it certainly would seem to look inaccurate. However, Professor _____ of the British Museum was not satisfied with this and he began to make further study. Now the British are great collectors and they had selected from Mesopotamia hundreds of thousands of clay tablets from ancient times; so many

they couldn't possibly read them all and they had them stored there in the British Museum. So many wonderful tablets they had stored there that when the Germans went on doing further excavation there in Mesopotamia and Babylon and didn't seem to find much, Professor _____ of the University of Berlin said that excavation in the British Museum seemed to be more profitable than excavation in Babylon. Well, Professor ____ began excavation in the British Museum; he began to study these tablets. And as he studied them, he hunted through hundreds of clay tablets, because every commercial transaction in those days had to be written down. Some people, you know, have had the idea that in the time of Moses they couldn't read and write. Why, long before the time of Moses, King Hammarabi, the King of Babylon, put up a big monument in the public square and on it he put the laws of Babylon and said in it that he has put these laws up here in the public square of Babylon, so that everyone who thinks he is wronged can come here and read the law and know what his rights are. How far ahead they were, of us in the United States today. If you want to know whether you're wronged or not, in the United States today, you may go and try to read the law; but it's pretty hard to find. You can go and hire a lawyer to tell you what it means and he may have to go to court to find out whether his interpretation is correct or not. But Hammarabi put the laws up there in the public square and he said anybody can come and read those laws and see what his rights are. Well you can see the people could read them. And to be sure they can read, you read on in the laws and you read this: If a man loses some property and this man sees his property in the hands of somebody else, he can go to the law and say "that man has stolen my property," and they seize the other man and they put him to death; unless the other man can bring witnesses to prove that he lawfully purchased that property, or unless he can bring sealed tablets that have the official seal of the witnesses on which prove he purchased it. And if he brings that, proving he purchased it from a third party, that third party is put to death, unless he can bring similar proof. So you see, it was worth a person's while to be able to read and write in those days. Reading and writing was common in the time of Moses, and long before, and there's no reason why the Bible could not have been written in those early times. But now here, we have these tablets written by these people in Babylon concerning all kinds of transactions and they're dated according to the kings. And _____ went and started reading them, one after another after another, tedious reading to try to see what he could learn about the final days of Babylon. And as he went through them he found one dated in the reign of King Nabonidus that mentioned the name Belshazzar. So there was a Belshazzar then, at any rate. And then he found one which told how a house was rented and it said this house was rented for three years by a certain man, and it said he was acting as Agent for Belshazzar, the King's son. So now you've got Belshazzar right in the royal family. But he went on hunting further and he found a tablet in which an oath was taken in the name of Nabonidus and of Belshazzar. And never were oaths taken in the name of anyone but either of God or a reigning king. So here's proof that Belshazzar actually was a reigning king. So far, Professor _____. But now Professor Daugherty, of Yale University took up the study; and he went on further, going into this matter and he published a book in the series of Yale Oriental Researches in 1928, which is entitled, "Nabonidus and Belshazzar." And in this book, Professor Daugherty gave evidence after evidence which he showed proof conclusively that Nabonidus, following a custom which many a king did in ancient times, made Belshazzar, his son, associate king with him; so they both were kings in the later years of his reign. And then Nabonidus retired to Tema, an oasis in the Arabian Desert and devoted himself to study there and left Belshazzar with the task of carrying on the government and leading the army. And Belshazzar had to make his plans to defend Babylon against the Persian attack and Nabonidus was out there enjoying himself at this oasis in the desert. And naturally when the Persians made their attack, they picked the Commander in Chief and head of the nation there as their principle adversary; just as in every war you pick someone you think of as the incarnation of everything wicked on the other side. In 1914 to 1918, it was Kaiser Wilhelm and in this last war it was Hitler. You always pick some individual and make him the incarnation of everything evil. And so they picked Belshazzar for the one to hate. And there was no reason to hate Nabonidus particularly. And when they took Babylon, Professor Daugherty

shows that Belshazzar was killed and we now have tablets that definitely prove it. But Nabonidus was allowed to live on and from then on they just vilified Belshazzar or said nothing about him. And Professor Daugherty went through the subsequent literature for the next five hundred years and he found that of all the literature that has been preserved for us, from the next five hundred years, right up to Josephus who bases his statement on Daniel, there is not one of them that remembers the name Belshazzar or the true facts about him; not one, until you get to Josephus, who bases it on Daniel. Now Professor Daugherty says the Book of Daniel is superior to all these other writings because it remembers the name Belshazzar correctly, it has the fact that Belshazzar was killed and, more than that, it has the fact there was a dual rulership in the kingdom; because twice in the chapter it is stated that the man who gives this interpretation will be made the third ruler in the kingdom. And of course, nobody reading the Bible, prior to 1928, knew what that meant - the third ruler in the kingdom. They might make guesses, but they didn't know, because we didn't know the facts about Nabonidus and Belshazzar. But Nabonidus was the first ruler, Belshazzar, the second, and so Daniel here is made the third. And the Bible thus preserved a record of this fact when it was otherwise completely forgotten. Now I think it is interesting; some people say you can take your own interpretation. After all, you get the facts, that's what's vital and then interpret them which way you want. But it's a good rule to interpret them the simplest way. Now there are two ways to interpret this. Here's one way: Daniel was there, Daniel knew the facts, Daniel wrote his book and he tells what happened; that's one way. Now here's the other way to interpret it, the way the critics must do if they hold to their view. Here were the Syrians, in 168 B. C.; a little band of Israelites under the Maccabees fighting for their lives against the Syrians. And here they were with the Syrian Army round about and in this situation, one of the Jews says, "I must write a book to encourage people, I must make up some wonderful stories to encourage them to fight against the Syrians." But, "he says, "I must get my facts straight." And so, this man left the army, where every man was needed in the battle, and he smuggled his way through the Syrian lines clear up to the north of Palestine. He made his way that long trip across the desert over to Mesopotamia and then down along the Euphrates River, until he came to Babylon. And when he got to Babylon, he managed to make friendship with one of the priests in one of the temples there and got him to teach him the old Babylonian language that was then practically forgotten. And he got him to permit him to go through the archives in the temple, those are archives that are now in the British Museum, and as he went through, day after day, as Professor _____ did; he studied one tablet after another tablet and finally he got the true facts about Nabonidus and Belshazzar. And then when he had the true facts he sat down and he made up his story as he wrote his book. And then having written his book, he made the long trip north along the Euphrates River, the long trip across the desert and then he smuggled his way through the Syrian lines, got down to the little band of Jews fighting for their lives and published a book to encourage them to go on fighting valiantly. Now, which seems more reasonable to believe? Which is the more reasonable interpretation? We cannot always find truth of the exact fact, but I think we can say this that when we get the facts together, all that we have, we will find that in many cases it's absolutely clear and in most cases it's quite clear that the most reasonable interpretation of them is the interpretation which the Bible gives. The Christian need never fear fact; we never have any reason to close our eyes to facts. God is the Creator of the universe and the facts are facts which God has established. And if we get the true facts, we will find that they fit with the statements of the Word of God. I don't want to give you the idea that it's extremely simple; it's a complicated study, it's a difficult study. Many people will talk like this and say, "Oh, it must be thrilling to study archaeology, just a thrilling study all the time." Well, you have days and weeks and months of hard drudgery working over fact after fact, studying this and that. And finally merges a fact which throws marvelous light upon a statement of the Word of God and which is tremendously useful in increasing your confidence in the fact that the Bible is dependable and true. How wonderful it is that we can know that this Bible is dependable.

People may dogmatically say things against it, they may ridicule it, they may say it's impossible to believe this; but who can say what is impossible? Fifty years ago, they said an airplane was impossible; but nothing is impossible with God and the Bible tells us the facts of what God has chosen to do. And most wonderful of all it tells us the facts which are applicable to us today. It describes the condition of each one of us, it shows us our sin and our wickedness. We see ourselves as a mirror in it, and we see that we deserve nothing but eternal punishment at the hands of a righteous God. But thank God, it doesn't stop with that; it shows us that our sin need not remain; it shows us that God sent His own Son, the Lord Jesus Christ to come down from heaven and to die on the cross that whosoever believeth on Him might not perish but have eternal life. And what a wonderful thing it is, the message of salvation that God offers. Jesus Christ said, "If I have told you of earthly things and ye believe not, how shall ye believe if I tell you of heavenly things?" The Bible tells us of earthly things and it stands every test and we can believe it when it tells us of heavenly things. Oh, may we study the Bible, may we seek to learn its truths, may we pray the Holy Spirit to apply it to our hearts, and may He use us to spread the message of salvation through His Word.

# FOSSIL SEQUENCE IN CLEARLY SUPERIMPOSED ROCK STRATA

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The Grand Canyon of the Colorado River has often been likened to a book whose pages reveal the story of many eons of earth history. The story is told not alone by the relationship of the rocks to one another and the relationship of the river to the overall structure, but in large measure by the remnants of life preserved in these rocks. Here on a vast scale and in an accessible form is a completely unprejudiced account of ancient life.

Since paleontology, the study of ancient life, is so frankly geared to evolutionary philosophy, it sometimes faces the accusation of tailoring facts to fit the philosophy. The present paper is neither intended to be such an accusation nor designed to be a defense of paleontological method; rather, it is merely an account of a succession of life forms as they actually occur in the Grand Canyon. This account will be proffered without aid of any supporting philosophy.

Some simple principles of geology will provide a background for this description:

The most common rocks at the earth's surface are those which are termed "sedimentary." Before becoming rock they are merely loose sediment which has been deposited in essentially horizontal layers by water or wind, in the sea or on land. Each layer of sediment, in fact each particle, is deposited in response to certain very precise chemical and physical conditions, and so long as those conditions prevail, either locally or over a large area, the resulting sedimentary deposits will be of one characteristic type and texture. Any change in the controlling conditions is manifested in a corresponding type of sedimentation which gives the ultimate rock its own differentiating character or lithology. Such changes may take place abruptly or gradually. Thus a relatively homogeneous layer of rock represents the persistance of relatively homogeneous environmental conditions during a short or long period of time. Vertical successions of such layers are the "strata" of geology.

Marine deposition of sediment, the most common type, cannot take place indefinitely upward. Each site of sedimentation has its own governing "base level" an horizon above which there can be only erosion and below which there can be only deposition. Thus the presence of a thick series of rock layers shows that the region must have been sinking in order to make continuous deposition possible.

The sea may gradually withdraw from an area and thereby establish a new and lower base level. The even surface of the newly exposed layer will then be subject to attack from forces of erosion, and if this region once more sinks beneath the sea and sedimentation is renewed, there will be a highly irregular contact between the old and new layers. Pebbles and boulders of the old lower stratum may be incorporated in the base of the new one, thus clearly showing the relative ages. The record of all these events will be preserved in the rock which is formed by a process of gradual hardening due to pressure from overlying material and the action of cementing agents. Thus in a vertical sequence of undisturbed horizontal sedimentary strata, each stratum is younger than that below and older than that above.

Although sedimentary rocks are for the most part laid down in horizontal layers, they may later slowly become folded and bent by earth processes. Folded layers may become beveled by erosion and then have horizontal layers of sediment deposited on top when the sea again covers the region. The resulting contact of nonparallel layers is called an "angular unconformity." Obviously, those layers which truncate are younger than those rocks which are truncated.

SLIDE 1: DIAGRAMMATIC PROFILE OF THE GRAND CANYON

This diagrammatic profile or cross section of the Grand Canyon shows the relationship of the strata on the north side of the Colorado River. All of the horizontal layers are sedimentary. Note that each has a symbol representing its own lithology (rock character). Also observe that the rock composing the canyon rim must be much younger than, for example, the rock of the Tonto Platform, since it is at the top of a series of undisturbed horizontal sedimentary strata. (Radioactive age determination indicates the passage of more than 250 million years during the formation of these layers).

Below the rock of the Tonto Group is another series of sedimentary layers, sloping markedly to the north and the east. This contact is an angular unconformity. Therefore we know that the Tonto Group is younger than these sloping layers which it truncates.

This second group rests in turn angularly upon, and is therefore younger than, a flat erosion surface which was formed on some badly deformed rocks. These were once sedimentary but were squeezed and distorted in such fashion that they lost their original character and some layers were forced nearly vertical. Since the flat surface of erosion must have been horizontal when the next layers were deposited upon it, but is now sloping parallel to the layers deposited upon it, a great disturbance must have simultaneously affected all of the rocks below the Tonto Group.

SLIDE 2: SIX STAGES IN PRE-CAMBRIAN HISTORY

The block diagrams will explain these events and make clear the relative ages of the rocks in question. The bottommost layers which we shall call "Rocks of the First Era," were originally deposits of sandstone and mudstone. Great pressure from the northwest and southeast pushed the layers up into mountains probably comparable to the present day Alps. Heat and pressure caused the rocks to recrystallize into a form known as schist, and intrusions of molten rock broke through from below. (Diagram 1).

Erosion wore down the mountains to a nearly level plain during what must have been a vast span of time. (Diagram 2).

Over this surface the sea came, causing deposition of more mud and sand. (Diagram 3). We shall call these "Rocks of the Second Era." This time the region was uplifted with little folding involved and these Rocks of the Second Era were broken through together with rocks of the First Era, causing huge blocks to slide upon one another, forming mountains, as is shown in Diagram 4.

These mountains in turn were worn down, probably even while they were being formed. (Diagram 5).

Once more the sea came in. The roots of the mountains of the second era were at first islands in this sea, and then as sinking continued they finally were buried beneath the sediment which now forms the lowest of the Rocks of the Third Era. (Diagram 6). Continued alternate sinking and rising of base level is responsible for the rest of the story.

SLIDE 1 again

It is not possible to give any other logical explanation of the relationship of the strata shown in this profile. The Rocks of the Third Era must be successively older from top to bottom, the Rocks of the Second Era must be older still, and the Rocks of the First Era oldest of all. The strata are clearly superimposed in chronological order. Subsequent gentle doming of the whole region has enabled the river and its tributaries to cut the mile-deep canyon, leaving all of this history plainly exposed to view.

SLIDE 3: PHOTOGRAPH OF UNCONFORMITIES IN THE GRAND CANYON

This photograph will show the clarity of the contacts as they actually appear in nature.

SLIDE 4: N-S CROSS SECTION OF THE GRAND CANYON

Farther back on the plateau into which the Canyon is now cut there are remnants of other layers which at one time covered the whole region. These are the Rocks of the Fourth Era. Their relationship to the Third Era is clearly shown by the accompanying cross section. They are flat, generally undisturbed layers and are unquestionably younger than those of the Third Era upon which they rest conformably. On top of them, but exposed even farther back from the Canyon, are the rocks of the Fifth Era. Thus within an area of one day's journey strata from the First to the Fifth Eras may be seen resting upon one another in consecutive order.

SLIDE 5: ANCIENT PLANTS AND ANIMALS

Nearly all of these layers contain some fossils. Here is an almost unparalleled opportunity to investigate the actual order in which various types of plants and animals are found fossilized, at least in this area.

Whether because they were actually absent or because they were destroyed in the course of mountain building, no fossils are found in the rocks of the First Era. Thus the first actual life is represented by colonies of fossil algae, some of the simplest of all plant life, in the layers of the Second Era. The preservation of algae may seem incredible, but comparison of them with modern ones shows them to be so strikingly alike that there can be no doubt of their validity. Sponge spicules have also been tentatively reported from the same layer, and if this becomes verified, it will be of interest that the first remnant of animal life belongs to a group of exceedingly simple organization. Sponges are considered to be the most "primitive" of the many-celled animals. In all of the layers from the rocks of the Second Era upward there are found certain tubes which are most readily interpreted as worm burrows and have been so accepted by most paleontologists.

The lowest layer belonging to the Third Era is called the Tapeats sandstone. In this sandstone are found algae in the form of sea weed, and marine animals belonging to two different divisions of the invertebrates (animals without backbones). One group comprised several species of scorpion-like creatures that are now extinct, and the other was composed of brachiopods, bivalved animals, mostly rather simple.

In the Bright Angel Shale, which lies upon the Tapeats sandstone, different genera and species of the preceeding groups are present. In addition there are other sea-shells: some doubtfully referred to the molluscs, others related to sea lillies, which are really animals, a primitive crustacean or crab-like animal, and a coral-like form of unknown affinity.

The next highest layer is the Muav limestone and in it are found only different genera and species of the animals of the preceeding shale. The Muav underwent a period of sub-aerial erosion during which great river channels were cut into it. When sediment was again deposited over the region by the sea, sand and lime together with fish remains were swept into these old channels. Later erosion removed all of what is called the Temple Butte limestone except that which was in the river channels, and so it is here that vertebrate life is first recorded in this sequence. The fish were quite unlike those we know in that they had a bony armour over the major portion of their body and scales only in the hinder portions.

The Redwall limestone, resting upon the Temple Butte and Muav, contains the shells of marine invertebrates. In addition to many genera of brachiopods there are fragments

of sea lillies, some true colonial corals and a type of moss animal or bryozoan.

Lying above the Redwall limestone is a great thickness of alternating sandstone and shale, the Supai Formation, which represents a delta and river flood plain environment. Here are found corals, brachiopods and true molluscs, such as clams and cockles, but of even greater interest has been the discovery of the tracks of large four-footed creatures which seem to have been some kind of amphibian. Reptilian type tracks have also been found. The plant life of the time included ferns, the simplest of land plants.

The next youngest layer, the Hermit Shale, presents one of the most interesting array of fossils in the entire strata of the Canyon. It, too, is a land deposit, probably the flood plain of a great river in an arid region. Here are found footprints of salamander-like animals, wings of giant insects and 35 species of plants, including primitive conifers or evergreens.

Immediately above the Hermit Shale is the Coconino Sandstone, a deposit of wind blown dunes. The only traces of life in this rock are the tracks of insects and at least 27 species of amphibians.

Following deposition of the Coconino sands, there was a new invasion of the sea, and in the Kaibab formation which rims the Canyon there are the remains of corals, sponges, sea lillies and sea shells. Many of these genera also occur in the lower layers, but in some cases the species of duplicate genera show a greater degree of complexity in these upper layers. Shark's teeth are found in the Kaibab but not in any other of the marine deposits which otherwise have somewhat similar faunal associations.

In summary, the rocks of the Third Era show first simple plant life and primitive marine invertebrate animals only, then fish remains and some different marine invertebrates. Next are found ferns, then evergreens, and in conjunction with these are the tracks of amphibians and reptiles and the imprint of insects. Finally there are a host of marine invertebrates and some shark's teeth.

SLIDE 6: ROCKS OF THE FOURTH ERA

The lowermost layer of the Fourth Era is nearly lacking in fossils, but in the Shinarump and Chinle strata above it occur the famous petrified forests. The trees of these forests are largely conifers, but four or five other species are reported to be present. (Unfortunately, detailed information about the plant life of all these Eras was not accessible at the time of writing this paper). The jaw of a relative of the crocodiles has been found in one of the forests, showing that at least one large species of amphibian lived at that time. Fresh water clam shells have been found in association with fern impressions in this region. The seas supported a great variety of life including many types of molluscs, some snails, crustaceans, moss animals, worms, sea lillies, corals, reptiles and fish.

It is in the overlying layers that the tracks and bones of dinosaurs are common. Dinosaurs were true reptiles, not amphibians, and the environment in which they were preserved for posterity as skeletons seems to have been that of river flood plains. Their known associates were other reptiles and some frog-like creatures. All of the reptiles reached quite astounding sizes before the end of the Fourth Era.

In rocks of the latter part of the Fourth Era mammal remains can be found and there is a great decline in the number of reptilian fossils. Intercalated coal beds indicate that there was luxuriant vegetation, and this is borne out by the presence of bits of fossil wood and foliage of deciduous trees.

Records of life are exceedingly sparse in the Fifth Era rocks, largely limited to fresh water clam shells which may be seen at Bryce Canyon. However, to the west of

Grand Canyon at least one deposit of bones has been found which contained elephant tusks and camel and bison teeth, and to the southwest human artifacts have been discovered in association with such teeth. These deposits are localized and because of lack of information concerning their relative age actually should not be included within the scope of the present survey. Nevertheless, it is certain that they are of a later period of the Fifth Era than that displayed at Bryce Canyon.

Thus in passing from the First to the Fifth Eras we have seen that simple plant life and possibly animal life of low organization occur in the Second Era; that some animals, namely the marine invertebrates, are found in one form or another from the beginning of the Third Era, and that starting in the middle of the Third Era, vertebrate animals appeared successively as fish, amphibians, reptiles and mammals. Plant life is successively recorded in algae, ferns, conifers and deciduous trees.

Possible explanations of all this and the questions which it raises cannot be discussed here. The fact to be emphasized is simply that in the Grand Canyon and its environs the fossil picture is one which does show a sequence from what have been denoted "simple" forms to those which have been denoted "complex." Whether this be a freak of preservation, a mere coincidence, or whether it holds deeper significance, the fact of its existance should not be overlooked.

# E Y E  W I T N E S S

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For establishing an impartial concept of mechanistic evolution versus special creation no other organ or structure of animate life offers such positive information as the organ of vision. Depending on the viewpoint, its evidence can be interpreted in three radically different ways.

First, there is the position of the evolutionist who sees in eye structures, when arranged in an ascending scale of complexity, abundant justification for his belief. Then there is the more logical appreciation of the failure of eye structures as a whole to fit into any possible taxonomic relationship which evolution can devise. Complete nullification of any progressive arrangement mechanistic development offers results from comparison of numerous structures occurring throughout the gamut of animal life. No plausible explanation of many of these structures, apart from controlled design on the part of a Creator will suffice. Lastly, there is the highly developed human eye with its marvelous mechanical and optical perfections testifying to an unbiased mind the absolute necessity for every part to have been planned by a Master Designer with skill and knowledge far surpassing the utmost the human mind can conceive.

The usual procedure in formulating evolutionary theories, of whatsoever sort they may be, is largely consideration of anatomical structures as a whole, without regard to radical variations in component parts. Progressive development of various organs, structures, etc., must be assumed to follow as a matter of course. Failure of any of these to keep pace with a general development scheme is not considered subversive to an evolutionary concept, even when no suitable theory can be offered to account for conditions as found. As a result of this position evolution feels justified in taking such a structure as the eye and by proper arrangement of various forms, trace an assumed development from origin all the way through to perfected organ. Such demonstration frequently carries conviction as to the correctness of the evolutionary concept to minds not skilled in the analysis of all the factors involved. Because of this, it appears advisable first to examine the train of reasoning adopted by mechanistic evolution in the case of the eye before presenting facts which cannot be made to fit into a mechanistic mold.

In the Amoeba there exists no evidence of light receptive differentiation, the entire cell functioning to perceive variations in light intensities. However, this is not the case with all unicellular organisms. In Euglena the first evidence of a localized light perceptor is found in an anterior pigment spot. The Euglena pictured in Figure 1, at a magnification of 1000 diameters, shows this early stage of what evolution assumes is to develop through the ages of time into an eye. Certain it is that light reception, when arriving at a more evident stage, is associated with an essential pigment foundation, such as present in Euglena.

Progressing to the metazoa we find certain cells functioning as light-sensitive detectors, occasionaly without pigment (as for example, in the Hydra, Lumbricus, etc.) but here a new departure in structure, also essential to a final eye form, is introduced. The light-sensitive cells are associated with a nerve plexus or more highly developed nervous system. However, we do not have to go far in the usual types of metazoan life to see both the pigment foundation and the specialized light-sensitive cells combined in function and associated with a nerve system.

The rotifera constitute a good example of this. Figure 2 shows a head-on view of a minute rotifer, Pedalion, at a magnification of 400 diameters, in which primitive eyes are evident. These consist of a pigment spot at the end of a terminal nerve cell forming part of a nerve plexus. But in spite of the minute size of this rotifer (only 250 microns in greatest dimension) a new principle in eye structure appears. The eyes are paired and spaced some distance apart. While different species of rotifers vary in the number of eyes present, - from none, to several pairs - the common case is one pair. In the extremely primitive eyes present in Pedalion, it appears that the photo-receptor is the pigment granule which may function through a heat-absorbing effect, detected by the associated nerve cell and made evident to the entire body via the nerve plexus. It is possible that with paired detectors a directional faculty is present.

Further specialization in other forms of life amplifies the pigment into multitudinous pigment cells arranged in the form of a hollow cup; also the single nerve cell has become many, situated within the pigment sector. Illustrative of this stage is the Leech (Glossiphonia) the eyes of which appear in a cleared and mounted specimen as in Figure 3 (magnification 300x). Other instances of this stage occur in widely different species. The planarians offer one such example. A median vertical section through a Planarian eye is shown in Figure 4, at 500 diameters. Thus far there does not appear any uniform arrangement of the light-sensitive nerve cells; they merely fill the pigment cup.

The relative size of an animal is no criterion of the degree of development of the organ of vision, nor, as will be seen later, is the degree of development in the scale of life a safe guide. Up to this point the eyes are elementary or strictly primitive. No image can be perceived, except possibly as an opaque object comes between the eye and the light source, thus casting a shadow. For the formation of an image a lens (or its equivalent) is essential. The inception of such lens can be represented by the eye of a minute water-mite (Hydracharina) as seen in Figure 5 (magnified 450x). Here we see a nearly spherical transparent lens placed in front of the nerve cells and projecting within the rim of the pigment cup. The entire eye is a unit, although as in the case of the more elementary form, still located within the body.

While we are not at this time discussing compound eyes, mention can be made of the equivalent stage to be found in some of the entomostraca (e.g., Daphnia) where several unit eyes with lenses are grouped together to form a clustered eye, looking very much like a miniature raspberry. A picture of this eye will be shown later.

The perfected lens of the simple eye can be illustrated by that of the body louse (P. vestimenti) where it is no longer within the body, but formed by a lenticular portion of transparent chitin. This lens, which is still minute, appears in optical section at a magnification of 1000 diameters as in Figure 6. Following the advent of such a lens and improvements in its design we find corresponding changes required in the photo-receptor cells. To be efficient in the detection of the image formed by the lens these can no longer be haphazardly placed within the pigment cup. They must be vastly increased in number, reduced in diameter so as to cover the least possible area of the image, and be disposed in the focal plane of the lens.

At this stage of developed eye structure, especially characteristic of the invertebrata we have many manifestations of the form the organ of vision may take. Illustrative of them may be cited that of the snail (Helix) which is shown in Figure 7 at a magnification of 75x, the individual eyes (ocelli) of insects, the eyes of spiders, those of the scallop (Pecten), and the ommatidia of compound eyes. Basically, however, these all possess certain structures in common. Such are: a corneal membrane, a crystalline (or cellular) lens, light-sensitive retinal cells (rods) systematically disposed in the focal plane of the lens, an enclosing pigment layer, and an optic nerve connecting the retinal cells to the brain or central nerve ganglion. In addition,

there may be found in some instances an anterior chamber between the cornea and the lens, migrating pigment for adapting the eye sensitivity to variations in light intensity, and other minor structures having specific functions.

Thus, step by step, evolution envisages progress in the development of the eye through the invertebrata, with ever increasing complexity of structure and refinement of operation until it reaches a high degree of function in the vertebrates, finding its full development in the mammals and man. Figure 8 shows in a section through the head, the stage reached in the reptilia. Eyelids, anterior chamber, iris, and primitive muscle control are evident. It is but a step more to the final perfected eye of the mammals and man.

How well the eye, when viewed in this light, appears to confirm the claims of evolution! It is not until we examine some of the evidence not conforming to the claims of evolution we discover that mechanistic evolution, regardless of the particular theory applied, does not, and cannot, explain how the eye came into being.

Let us take the case of Amphioxus in the scale of life assigned to it by evolution. It is ranked among the most primitive of the chordata since it possesses the beginning of a back-bone. Presumably, therefore, it has evoluted above or beyond the invertebrata, forming a connecting link with the fish, via the Lampreys (Petromyzon, etc.) The general anatomical relationships would seem to bear this out. But just where in the evolutionary tree did it branch off? If its position were to be established on the basis of eye structure amphioxus must be placed among the lowest forms of invertebrate life. The mass of pigment usually designated the cranial eye-spot (shown in Figure 9 at a magnification of 150 diameters) is little more than the pigment spot in the euglena. This, however, is not the only eye amphioxus possesses. Scattered throughout the anterior portion of the nerve cord are numerous other eye-spots (Figure 10, also 150 diameters) consisting of two cells each-- a pigment cup and a light-receptor cell lying within it. A couple of these are shown in a transverse section in Figure 11, at a magnification of 1000 diameters. What an apology for an eye, or eyes, in an animal placed at the beginning of the backbone animals! The larval eyes of the related Tunicates, lost completely in the adult stage, are in the same category. As a matter of fact, the eyes of some amphistome cercariae, also lost in the adult stage, are higher in the scale than amphioxus, as is evident from Figure 12 (at 750x) where they are seen to be paired. The question as to why an animal so highly developed as amphioxus in other respects does not at least possess paired eyes, is unanswerable from an evolutionary standpoint.

Among other equally unanswerable questions (which are multitudinous) related to eye structure may be cited the following:

Why does the lowly mollusk, Pecten, possess a hundred or more individual stalked eyes each with a well-formed cellular lens and an inverted (vertebrate) type of retina? This eye is shown in section in Figure 13, at a magnification of 125 diameters.

How explain the occurrence of stalked eyes in such widely diversified forms of life as Pecten, Helix, Squilla, Cambarus and, most remarkable of all, the African fly, Diopsis, shown in Figure 14? Where is the common starting point? Why are some of these stalked eyes simple and others compound?

How account for compound eyes? True, it is possible to find connecting forms suggesting a possible line of development when eyes only are considered. For instance, in Planaria we have the common paired primitive eye (Figure 15, at 50 x) while in the closely related form Polycelis (Figure 16, at 60 x) a multitude of primitive eyes, more or less uniformly scattered throughout the anterior region take the place of the paired eyes. Going now to Leptoplana, another near relative,

the considerable number of eyes have become clustered (Figure 17, at 50x). From here we might progress to a primitive compound eye such as found in Daphnia, Figure 18, at 300x, and so on through various stages until we reach the highly developed compound eye of the crayfish shown in section in Figure 19, at 20x. But are we to reason from this arrangement that each organism in the chain is an ancestor of those showing progressive advance toward the highly developed compound eye? Even evolutionary biologists cannot so claim; then how construct a genealogical tree which will satisfy eye structure?

How explain the fact that some insects possess simple paired eyes, others have only compound eyes while many have both, the common case in this latter instance being the presence of three triangularly placed simple eyes (ocelli) between the compound eyes? Figure 20 shows a section through the head of a dragon-fly, median through two of the ocelli as well as the compound eyes. The structure of the ocelli is brought out in Figure 21, magnified 175 diameters. (Note: this is from a stained section, hence the lens shows dark.)

Why are the spiders and their close associates usually provided with simple paired eyes, from one to several pairs? It would seem more in keeping with their place in taxonomic classification for them to have compound eyes. More curious yet, why are the anterior median eyes of the inverted, or post-bacillary, type corresponding in general to vertebrate eyes in development and design, while all the other pairs are of the erect or prebacillary type? Here is something for evolution to ponder over. Then again, why are some spiders (the nocturnal species) provided with a tapetum?

In regard to the presence of a tapetal layer back of the retina, how can evolution account for its existence in the various forms of life in which it occurs? We find it in some spiders, some insects, some birds (e.g., the owls), bats, the cat tribe and other widely separated forms. Since the tapetum enhances vision in weak light and thus becomes an additional refinement, why have not all the mammals and man been the recipient of such ultra refinement? Why are there so many different types of tapetal structure, all serving the same purpose?

If there were no other evidence against a mechanistic evolutionary concept, except the case of the eye of Sepia we would still have ample to justify repudiating it absolutely. As previously intimated, if evolution of all forms of life from some original form was brought about by purely external mechanistic forces apart from controlled origin by a Creator, then each type of organism must have branched off from pre-existing species at some stated time and place. In other words, the construction of a genealogical tree becomes not only possible, but necessary. Each new development must have been built upon what had preceded. Let us now raise the question, "Where did the mollusca, which includes the Sepia, leave the stem which later produced the vertebrates?" Certainly this must have occurred while the eye development was still very primitive. Then how can we explain the parallel development of the eye of Sepia and the mammalian eye to a point of substantially equal efficiency on the one hand, yet one a strictly invertebrate eye while the other is the typical inverted eye with its retinal origin via the neural tissue?

Few biologists appreciate the remarkable refinements found in the eye of Sepia and the degree to which it approximates the mammalian eye. Figure 22 shows a median section through the head and eyes of Sepia. In it can be seen the eyelids, corneal membrane, iris, the remarkable two-piece lens providing correction for aberrations in a manner similar to the combined anterior chamber of the human eye, the suspensory ligaments, the pigmented ciliary processes, the retina, the choroid, the sclerotic shell and muscles for moving the eye. How could this eye have developed independently so as to approximate the mammalian eye, from the point in past ancestry from which they both emanated?

How can we fit into an evolutionary scheme the pin-hole camera eye of the Pearly Nautilis? Here there is no lens, the sea-water filling the eye cavity and impinging directly on the retina, the image being formed by the minute opening in the iris.

And what shall we say about the pineal eye--so obviously a primitive eye structure in many of the lizards, even to the extent of functionability in Hatteria, yet an interior endocrine gland in mammals?

These are but a few of the many problems presented by eye structure which cannot be solved on a mechanistic evolutionary basis. They all testify to design in created life, completely under control of a Master Designer.

This brings us to a final discussion of evidence gleaned from the eye as to the extent to which the design of the eye has been perfected by Him who doeth all things well. Since many of the facts already presented demonstrate this as regards the lower orders of life, we can now confine ourselves largely to consideration of the perfected eye given to us humans.

A paper on "The Eye as an Optical Instrument" by Dr. Frank Allen was presented at the 1948 Convention of the Association. In this was outlined the marvelous performance of the human eye from the optical standpoint. It will therefore not be necessary to review this phase of the subject at this time, but rather point out some of the mechanical and physical features which could not have been the result of chance. That some of the intricacies of the eye present problems not explainable by any theories of mechanistic evolution has been tacitly admitted by numerous evolutionists. For example, witness Darwin's own statement: "To suppose that the eye with all its inimitable contrivances for adjusting the focus to different distances, for admitting different amounts of light, and for the correction of spherical and chromatic aberration, could have been formed by natural selection, seems, I freely confess, absurd in the highest degree." However, he goes on to say, "Reason tells me that if numerous gradations from a simple and imperfect eye to one complex and perfect can be shown to exist, each grade being useful to its possessor, as is certainly the case; if further, the eye ever varies and the variations be inherited, as is likewise certainly the case; and if such variations should be useful to any animal under changing conditions of life, then the difficulty of believing that a perfect and complex eye could be formed by natural selection, though insuperable to our imagination, should not be considered as subversive of the theory." (Origin of Species, Chapter 6) In other words, in spite of the absurdity and the impossibility of even imagining it to be true, if you are going to accept the theory you must also accept the absurdity! While he is limiting these remarks to his own pet theory, they will be found applicable to all others as well.

Recognizing that the eye functions as a camera, it is not surprising that the outer spherical box consists of a firm, hard shell (the sclerotic) capable of holding all parts in rigid relation to each other. This is coated on the inside with an opaque black layer (the choroid) against which the sensitive film (the retina) is located. The relationship of these three layers is seen in section in Figure 23. The front of the camera is taken up with the compound lens (the anterior chamber and crystalline lens) combined with its 'between the lens' diaphragm (the iris), and shutter (the eyelids). Automatic focusing and light intensity control are provided, far beyond anything possible in the highest grade cameras today. All of this suggests careful design by One cognizant of all the physical laws involved.

Just as in a camera, the best definition occurs in the area surrounding the optic axis, so we find in this area of the eye a central depression, the fovea, where vision is of the highest order and color perception at a maximum. Figure 24 shows a section through this minute pit and the optic nerve. A higher power detail of the fovea is seen in Figure 25. When we wish to see anything clearly we must bring it to focus in

the fovea. Because of this the most intense and least refracted light falls on this area. To off-set this, special provision is made to prevent undue damage to the retina surrounding the fovea, especially by short waves. This is the incorporation of a yellow filter in this area, known as the macula lutea (yellow spot). Thus we have the camera analogy carried still further. All camera fans are aware of the purpose and value of a yellow filter in this same connection.

The light receptor cells of the retina are the rods and cones. Both pick up light rays but only the cones are able to differentiate various wave frequencies (color). At the fovea there are no rods present but as the distance from the fovea increases the rods become more numerous until at the periphery there are no cones. Since the light falling on the outer zones distant from the fovea is much less, no yellow filter is required but provision must be made to equalize the lesser light intensity. A supersensitizing is required. Since the eye sensitivity is at a maximum in the middle of the spectrum, gradually falling to zero at the blue and red ends, these end colors must be enhanced to register. Some years ago it was discovered that camera film could be made more sensitive to any desired color by the incorporation of a dye of that color in the film. At that time it was not known that the Maker of the eye employed this same principle to enhance the color perception at the two ends of the spectrum by the presence of a blue-red (purple) dye in the retina. This is known as rhodopsin, or 'visual purple.' Can anyone conceive of this being brought about by blind chance, as required by mechanistic evolution?

A complete discussion of all the other marvelous adaptations found in the eye would extend the length of this paper unduly; therefore only brief mention can be made of most of them.

The entrance of the optic nerve through the retina necessitates a blind spot in each eye. That this blind spot will not cause us any inconvenience, it has been arranged so that the optic nerve enters each eye at an interior angle and thus the blind spots cannot coincide. Thus we are not cognizant of it when both eyes are in use.

The function of the choroid layer back of the retina is to absorb such light as passes through the retina and therefore not utilized. The pigment is extra thick surrounding the blood vessels since if all the light were not absorbed, as is the case when extremely brilliant light enters the eye, the red reflection caused by the blood would make us see red! Similarly, there are no blood vessels in the cornea which would act as a red filter.

In order to perceive fine detail--up to over 200 lines per inch the rods and cones must be of extremely fine diameter and positioned so that the light strikes them on the ends. There are about 2,000,000 rods and cones in each eye. Everyone of these must be able to transmit its own impulse to the brain via the optic nerve, which can be likened to a telephone cable serving two million phones.

Since there is a reflecting surface on the retina and the choroid cannot absorb 100% of the light striking it, some light must be reflected back toward the front. Such as strikes the lens passes outside the eye and does no harm, but the reflection being general, some light impinges on the entire back surface of the anterior chamber. Should this be re-reflected toward the retina it would fog the image and poor vision would result. To prevent this occurring, the back surface surrounding the lens is provided with a light trap known as the ciliary processes. These are pigmented corrugations circularly disposed about the lens. A cross-sectional view of a few of these is shown in Figure 26 (magnified 55x). It is obvious that any light striking such a surface as these present will be securely trapped within the processes themselves.

The marvelous correction for optical aberrations provided by the anterior chamber, the aspheric form of the cornea and crystalline lens and the varying refractive

indices of the latter cannot have been the result of blind chance or the operation of any external conditions (e.g., natural selection, use or disuse, environment, isolation, or other) as predicated by various theories of mechanistic evolution. They testify to preconceived original design on the part of a Creator. The same can be said of the complete automatic co-ordination of every portion and function of the eye-muscular movement in every direction for bringing the image of an object to the fovea, focusing for distance (anything from a few inches to infinity), control of light intensity by the iris diaphragm, independent movement of the eyes to provide binocular vision, automatic lubrication of the eyelids, and their almost instantaneous closing in the event of threatened danger to the eyes. Mention might also be made of the provision for controlling the amount of lubrication by means of the tear ducts.

One feature of design in the crystalline lens not so commonly known is the nature of the fibers constituting the interior portion of the lens. Since these fibers are positioned in a parallel manner it is obvious a striation effect would result and vision be impaired accordingly. How did the Master Designer solve this problem? By the simple expedient of providing irregular serrations on the edges of the fibers so that as they fit together no multiplicity of straight surfaces can occur. This can only be observed by separating out the individual fibers, then the serrations become evident, as can be seen in Figure 27. Mechanistic evolution cannot account for this provision.

Perhaps no function with which the eyes are endowed is so spectacular as light detection itself, especially color perception. Light waves travelling at 186,000 miles per second and vibrating anywhere between 450 trillion and 750 trillion per second enter the eye and are picked up by a set of cells especially tuned to receive them. The stimulus set up in these cells must be converted into vibrational energy impulses of an entirely different sort for transmission over the nerve cables to the central station, the brain. This converted energy does not travel at 186,000 miles per second but only a few hundred feet per second, yet it must faithfully reproduce the variations in light intensities and frequencies. The retina itself is a very complicated structure, consisting of ten separate layers, only one of which is the rod and cone layer. The transformation of light energy into nerve energy is accomplished in these various other layers, that is, they constitute a two-stage step-down transformer, as it were. Since each rod or cone may be transmitting a signal different from all others, the transformation is a complicated process.

In other portions of the nervous system throughout the entire body, terminal nerves are continuous through ganglia and various types of nerve fibers, and thus are connected directly with the brain. Not so the rod and cone cells with their nuclear portion. Minute fibrils from the latter terminate in a reticular layer. Likewise the next nuclear layer has fibrils terminating in this layer without, however, being in any way directly connected to the rod and cone cells. This same construction is repeated in a second reticular layer, into which ganglion cell fibrils also enter. The ganglion cells are connected via the optic nerve to the brain. Figure 28 shows this structure diagramatically both for vertebrate eyes and highly developed invertebrate eyes. The transformation of light energy to nerve energy takes place in these reticular layers, a two-stage process. The various layers in the human retina are shown in section in Figure 29; the retina of Sepia, an invertebrate eye where the same condition obtains, is shown in Figure 30. Could uncontrolled evolution have ever produced this remarkable functioning structure, though we grant it a hundred billion years to bring it about? But further, on the same subject, a remarkable confirmation; even the compound eyes of insects, with their thousands of ommatidia must function in a similar manner in order to transform light energy to nerve energy! Study of the various layers occurring in the eye of the common house-fly, as revealed in Figure 31 will confirm this.

If the rank and file of individuals were asked why we are provided with two eyes, the common reply would be that if one were damaged or destroyed we would still have another to fall back on. This, however, is but one advantage; the main purpose is to provide binocular vision. The two eyes see any object from different angles, the muscular control automatically moving the eyes independently to focus the object on the fovea of each. Then the brain automatically measures the parallax angle between the eyes and computes the distance away. Also it computes at the same time the focal length of the lens required to bring the object to a correct focus, adds these two values together and true stereoscopic vision results. Truly this is a remarkable design.

In this connection mention should be made of the eyes of birds, so situated on opposite sides of the head that true binocular vision is impossible. Yet birds fly fast and must be able to judge distances accurately. How are they provided for in this respect? The method is unique. The eyes are equipped with two fovea, located a little distance apart. Vision is perfect in either fovea, hence by the simple expedient of moving the head through a small angle an object can be brought to focus first on one fovea, then on the other and the angle through which the head moves tells the bird just what our binocular vision does. It is interesting to observe this head movement in a canary or chicken as they examine a visitor closely.

There are many other eye structures equally positive in their testimony to a Master Designer back of each and every detail. That this applies to all animate creation as well can be illustrated by a single instance. Spiders shed their chitinous skins periodically and the eye lens of the spider is integral with the skin. Therefore, when the skin goes, the lens goes with it. But back of the lens is a special layer of cells, the sole function of which is to provide a new lens whenever required. This rejuvenating layer is seen in a vertical section through the eye lens of a spider in Figure 32. Even the lowly forms of life have a God who is able and adequate to supply every need.

In closing, let it be pointed out that to those of us who believe the inspired Word and know a God able to bring things to pass, the issue is <u>not</u> whether all physical life is one in essential being, since God could have created it in exactly that way if He chose. The issue on which we stand is that He conceived, planned and executed every form of life according to the counsel of His own will; therefore, mechanistic evolution, as expounded under many and devious theories had nothing whatever to do with it.