

£3.50

THE GENESIS FLOOD

*The Biblical Record and Its
Scientific Implications*

by

JOHN C. WHITCOMB, JR., Th.D.

*Professor of Old Testament, Grace Theological
Seminary, Winona Lake, Indiana*

and

HENRY M. MORRIS, Ph.D.

*Director of the Institute of Creation Research
Vice-President of Christian Heritage College, San Diego, California*

Foreword by

JOHN C. McCAMPBELL, Ph.D.

*Professor and Head, Dept. of Geology, University of
Southwestern Louisiana, Lafayette, Louisiana*

BAKER BOOK HOUSE
Grand Rapids, Michigan

FOLKLORE MATTERS

from the

ALAN DUNDES

FOLKLORISTICS COLLECTION

USC LIBRARIES
UNIVERSITY OF SOUTHERN CALIFORNIA

THE AUTHORS

JOHN C. WHITCOMB, JR., is Professor of Old Testament at Grace Theological Seminary, Winona Lake, Indiana. His undergraduate education was completed at Princeton University where, after a two-year delay while in military service, he received the A.B. degree, *cum laude*, in 1948. He earned the B.D. degree in 1951, the Th.M. in 1953, and the Th.D. in 1957, all at Grace Theological Seminary. Dr. Whitcomb has contributed articles to several theological journals and to *The New Pictorial Bible Dictionary*, *The New Bible Dictionary*, and *The Encyclopedia of Christianity*. He has written the commentaries on Ezra, Nehemiah and Esther in the *Wycliffe Bible Commentary* (Moody Press), and his *Chart of Old Testament Kings and Prophets* (4th edition, 1962) is being used in nearly 200 colleges and seminaries. Dr. Whitcomb is the author of *Darius the Mede: A Study in Historical Identification* (Eerdmans, 1959).

HENRY M. MORRIS has been Professor of Hydraulic Engineering and Chairman of the Department of Civil Engineering at the Virginia Polytechnic Institute since 1957. His education includes a B.S. from Rice University "with distinction," in 1939, and the M.S. and Ph.D. degrees from the University of Minnesota, in 1948 and 1950, respectively. He spent three years with the International Boundary and Water Commission, first as Junior Engineer, then as Assistant Hydraulic Engineer, followed by four years on the civil engineering faculty at Rice. He was on the faculty of the University of Minnesota during the period of 1946-1951, and was Professor and Head of the Civil Engineering Department at Southwestern Louisiana University from 1951 through 1956. A full Member of Sigma Xi, an Honor Member of Chi Epsilon, and a Member of Phi Beta Kappa and Tau Beta Pi, all honorary societies, he is a Fellow of the American Society of Civil Engineers and of the American Association for Advancement of Science, and holds professional memberships in the American Geophysical Union, the American Meteorological Society, the National Society of Professional Engineers, the Geochemical Society, the International Commission for Irrigation and Drainage Research, and others. Dr. Morris is Chairman of the Applied Hydraulics Committee of the American Society for Engineering Education, is a member of various other regional and national committees, and has biographical listings in six different "Who's Who" publications.

Contents

	Page
FOREWORD	xv
INTRODUCTION	xix
PREFACE TO THE SECOND PRINTING	xxiii
PREFACE TO THE SIXTH PRINTING	xxv
ACKNOWLEDGMENTS	xxx
CHAPTER I. BASIC ARGUMENTS FOR A UNIVERSAL FLOOD	
<i>The Depth of the Flood</i>	1
<i>The Duration of the Flood</i>	3
Twenty-one Weeks of "Prevailing"	4
Thirty-one Weeks of "Assuaging"	4
<i>The Geology of the Flood</i>	7
<i>The Size of the Ark</i>	10
<i>The Need for an Ark</i>	11
<i>The Testimony of the Apostle Peter</i>	14
<i>The Total Destruction of a Widely-Distributed Human Race</i>	16
The Total Destruction of Humanity	17
The Extensive Distribution of the Antediluvian Race	23
<i>Summary and Conclusion</i>	33
CHAPTER II. BASIC ARGUMENTS AGAINST AN ANTHROPOLOGICALLY UNIVERSAL FLOOD	
<i>Introduction</i>	36
<i>Indians in America Before the Flood</i>	37
The Babylonian Flood Account	37
The Presuppositions of Age Determination Methods	43

<i>All Mankind Not Descended From Noah's Family</i>	44
The Sons of Noah	45
The Table of Nations	45
The Bible and Racial Distribution	46
Anthropology and Racial Distribution	47
<i>Summary and Conclusion</i>	54
CHAPTER III. BASIC NON-GEOLOGICAL ARGUMENTS AGAINST A UNIVERSAL FLOOD	
<i>Universal Terms Used in a Limited Sense</i>	55
Most Universal Terms Are to be Interpreted Literally	56
The Context Determines the Meaning	56
Universal Terms Are Literal in Genesis 6-9 Because of the Physical Phenomena	60
<i>Noah and the Animals</i>	63
Gathering the Animals to the Ark	63
The Capacity of the Ark	65
Caring for the Animals in the Ark	70
The "Natural-Supernatural" Philosophy of Miracles	75
<i>Postdiluvian Animal Distribution</i>	79
Three Major Views	80
Australian Marsupials	81
Rapid Animal Dispersion	84
<i>Summary and Conclusion</i>	86
CHAPTER IV. UNIFORMITARIANISM AND THE FLOOD: A STUDY OF ATTEMPTED HARMONIZATIONS	
<i>Introduction</i>	89
<i>Cuvier's Catastrophism and the Diluvium Theory</i>	92
Cuvier's Multiple Catastrophism	92
Buckland's Diluvium Theory	93
<i>Lyell's Uniformitarianism and the Tranquil Theory</i>	95
The Rise of Uniformitarianism	95
The Tranquil Theory	97
The Language of Scripture	99
The Imperiling of the Ark	102
The Olive Leaf	104
<i>John Pye Smith and the Local Flood Theory</i>	107
The Birth of the Theory	107

Sir Leonard Woolley and the "Flood Stratum" at Ur	109
The Local Flood Theory and Uniformitarian Geology	111
<i>Summary and Conclusion</i>	113
CHAPTER V. MODERN GEOLOGY AND THE DELUGE	
<i>Introduction</i>	116
<i>Geological Implications of the Biblical Record</i>	120
Tremendous Erosion from Rainfall	120
Clouds Not the Source of the Deluge Rains	121
Enlarged Ocean Basins	121
Volcanic and Seismic Upheavals	122
Unprecedented Sedimentary Activity	123
Ideal Conditions for Fossil Formation	123
Uniformitarianism Undermined by the Flood	123
<i>Basic Harmony of the Field Data and the Biblical Inferences</i>	124
Nature of Sedimentary Strata	124
More Water in the Present Oceans	124
Volcanism	126
Earth Movements	127
Fossilization	128
<i>The Uniformitarian Interpretation of Geology</i>	130
The Present: the Key to the Past	130
Organic Evolution	131
The Geologic Time-Table	132
Methods of Resolving Contradictions	135
<i>The Inadequacy of Uniformity to Explain the Strata</i>	136
Volcanism and Igneous Rocks	137
Earth Movements	139
Continental Ice Sheets	142
Phenomena of Sedimentation	144
Fossil Graveyards	154
<i>Contradictions in the Uniformitarian System</i>	169
Misplaced Fossils	172
Living Fossils	176
Formations out of Sequence	180
<i>Summary</i>	200
CHAPTER VI. A SCRIPTURAL FRAMEWORK FOR HISTORICAL GEOLOGY	
<i>Introduction</i>	212
<i>The Scriptural Divisions of Geologic History</i>	214

The Initial Creation Itself	214
The Work of the Six Days of Creation	214
The Antediluvian Period	215
The Deluge	216
The Modern Post-Deluge Period	216
<i>The Beginning of Creation</i>	218
The Origin of the Solar System	218
The Origin of the Universe	218
The Primeval Earth	219
<i>The Scientific Basis of Creation</i>	222
The First and Second Laws of Thermodynamics	222
The Unique Processes of Creation	223
The Entropy Principle and Evolution	224
<i>The Geologic Work of Creation Week</i>	228
The First Day	228
The Second Day	229
The Third Day	229
<i>Creation of "Appearance of Age"</i>	232
Modern Rejection of This Biblical Doctrine	233
The "Steady-State" Cosmology	235
The "Eternal Oscillation" Cosmology	236
Importance of the Doctrine of a "Grown Creation"	237
<i>The World That Then Was</i>	239
"Waters Above the Firmament"	240
No Rainfall Before the Flood	241
Little Volcanic or Tectonic Activity	242
<i>Geologic Evidences of Antediluvian Climate</i>	243
Universally Warm Climate	243
The Supposed Permian Glaciation	245
Explanations of Climatic Change	250
The "Greenhouse Effect"	253
The Antediluvian Vapor Blanket	255
<i>Overflowed With Water</i>	258
The Destructive Power of Modern River Floods	259
Destructive Power of Ocean Waves	261
Sedimentation and Fossilization During the Flood	265
<i>Emergence of the Lands</i>	266
New Atmospheric Movements	266
Isostatic Readjustments	268
<i>The Order of the Strata</i>	270
Tectonic Origin of Continental Blocks	271
Sequence of Stratified Beds	271

Early Burial of Marine Creatures	273
Hydrodynamic Selectivity of Moving Water	273
Higher Mobility of the Vertebrates	275
Burial of Land Animals and Plants	275
Formation of Coal Beds	277
The "Mesozoic" Strata and the Dinosaurs	279
<i>The Final Flood Deposits</i>	281
Tertiary Stratigraphy	281
Mammals as Index Fossils	284
Uplifts of the Pliocene	286
Continuing Abnormal Conditions	287
<i>Post-Deluge Geologic Activity</i>	288
Freezing of Arctic Soils	288
Siberian Mammoth Beds	289
<i>The Glacial Period</i>	292
Onset of the Ice Age	292
Ice-Age Theories	293
The Flood and the Glacial Period	294
The Theory of Multiple Glaciations	295
The Evidence for Only One Glaciation	296
<i>The End of the Ice Age</i>	303
Sudden Warming of the Climate	303
Atmospheric Carbon Dioxide	306
<i>Residual Effects of the Deluge Period</i>	311
Continuing Volcanic and Tectonic Disturbances	311
Enclosed Lake Basins and Raised Beaches	313
Raised River Terraces	318
Evidence of Former Lower Sea Levels	324
<i>Summary and Conclusion</i>	326

CHAPTER VII. PROBLEMS IN BIBLICAL GEOLOGY

<i>Introduction</i>	331
<i>Methods and Results of Geochronology</i>	332
<i>The Lead Age Methods</i>	334
Experimental Difficulties	334
Original Lead	335
Leaching	335
Lead Isotope Methods	336
Radiogenic Lead Contamination	337
Other Methods	340
Discordant Ages	341

<i>Contents</i>	
<i>The Rubidium Method</i>	341
<i>The Potassium Methods</i>	342
<i>The Significance of the Radioactivity Data</i>	343
<i>The Fact of a "Grown" Creation and "Apparent Age"</i>	344
<i>Variations in the Decay Rates</i>	346
Supposed Invariability	346
The Decay Processes	347
Alpha-Decay and the Potential Barrier	348
External Energy Sources	349
Cosmic Radiation	351
The Van Allen Radiation Belt	353
<i>Agreement of Ages from Different Methods</i>	355
Creation of Accordant "Apparent Ages"	356
Concordant Changes in Decay Rates	357
Pleochroic Halos	359
<i>Supposed Correlation of Radioactivity and Stratigraphic Ages</i>	362
Extent of Agreement	362
Cause of Apparent Limited Agreement	366
<i>Astronomic Methods of Age Measurement</i>	368
<i>The Radiocarbon Dating of Recent Deposits</i>	370
Assumptions in the Method	371
<i>Carbon 14 and the Deluge</i>	374
Antediluvian Radiocarbon Proportions	374
Postdiluvian Radiocarbon Proportions	376
<i>Contradictions in Geochronology</i>	378
Meteoritic Dust	379
Meteorite Radioactivity	380
Tektites	381
Disintegration of Comets	382
Atmospheric Helium	384
Salt in the Sea	385
Juvenile Water	287
Crustal Accretion	389
<i>Post-Deluge Chronology</i>	391
Tree Rings	392
Origin of Postdiluvian Civilizations	393
Population Statistics	396
<i>Antediluvian Longevity and Radiation</i>	399
Effect of Canopy on Longevity	399
Somatic Effects of Radiation	399
Genetic Effects of Radiation	401

<i>Contents</i>	xi
Decrease in Life-Span after Precipitation of Canopy	404
<i>Formations Implying Slow Deposition</i>	405
Deposition and Lithification	406
Coral Reefs	408
Deep-Sea Sediments	409
Evaporites	412
Cave Deposits	417
Buried Forests	418
<i>Varved Deposits</i>	421
Difficulties in Varve Interpretation	421
Green River Formation	424
Other Causes of Lamination	428
<i>Origin of Oil and Mineral Deposits</i>	429
Uniformitarianism and Petroleum Geology	429
Stratigraphic Occurrence of Oil	432
Formation of Petroleum Deposits	434
Rapid Formation of Petroleum Pools	436
Origin of Ore and Mineral Deposits	437
<i>Modern Significance of the Genesis Flood</i>	438
Bankruptcy of Uniformitarianism	439
Importance of the Question	440
Two Basic Philosophies	440
Theistic Evolution Rejected	441
Evolution, Communism and Humanism	443
Evolution and Education	445
Biblical Christianity and Evolutionary Philosophy	446
The Scientific Weakness of the Evolutionary Hypothesis	447
Strategic Role of Historical Geology	449
The Prophetic Testimony of Scripture	451
APPENDIX I. PALEONTOLOGY AND THE EDENIC CURSE	
<i>Introduction</i>	454
<i>Anthropology and the Fall</i>	455
<i>The Animal Kingdom and the Fall</i>	458
The Bondage of Corruption	459
Adam's Dominion over Animals	459
Vegetarian Diet Before the Fall	461
The Edenic Curse and Structural Changes	464
<i>The Plant Kingdom and the Fall</i>	466

xii Contents

<i>The Balance of Nature and Harmonistic Theodicy</i>	468
<i>Summary and Conclusion</i>	471

APPENDIX II. GENESIS 11 AND THE DATE OF THE FLOOD

<i>Genesis 11 Need Not Be Interpreted as a Strict Chronology</i>	474
The Numbers of Years Are Not Totalled	474
The Name and Years of Cainan do not appear in the Hebrew Text	475
Genesis 5 and 11 Are Perfectly Symmetrical in Form	475
Information Is Given Concerning Each Patriarch Which Is Irrelevant to a Strict Chronology	476
The Postdiluvian Patriarchs Could Not Have Been Contemporaries of Abraham	477
The Bible Implies a Great Antiquity for the Tower of Babel	478
The Messianic Links Were Seldom Firstborn Sons	479
The Term "Begot" Sometimes Refers to Ancestral Relationships	481
<i>Genesis 11 Cannot Be Stretched Beyond Certain Limits</i>	483
The Analogy of Biblical Chronology	485
The Dating of the Tower of Babel	486
The Patriarchs and the "Old Stone Age"	487
The Babylonian Flood Traditions	488
<i>Conclusion</i>	489

INDEX OF SUBJECTS	491
-------------------	-----

INDEX OF NAMES	508
----------------	-----

INDEX OF SCRIPTURE	515
--------------------	-----

List of Illustrations and Diagrams

<i>Fig. 1 The Chronology of the Flood</i>	3
<i>Fig. 2 The Abating of the Flood Waters</i>	8
<i>Fig. 3 Patriarchal Ages at Maturity and Death</i>	24
<i>Fig. 4 Diagram of Three Genesis Kinds</i>	67
<i>Fig. 5 Geologic Time Table</i>	133
<i>Fig. 6 Grand Canyon of the Colorado</i>	152
<i>Fig. 7 Incised Meanders</i>	155
<i>Fig. 8 Fossil Graveyard</i>	161
<i>Fig. 9 Footprints in Cretaceous River Bed</i>	167
<i>Fig. 10 Contemporaneous Footprints of Man and Dinosaur</i>	174
<i>Fig. 11 Giant Human Footprints in Cretaceous Strata</i>	175
<i>Fig. 12 The Tuatara</i>	177
<i>Fig. 13 Heart Mountain Thrust</i>	182
<i>Fig. 14 Supposed Thrust Contact Line</i>	183
<i>Fig. 15 The Lewis Overthrust</i>	186
<i>Fig. 16 Chief Mountain</i>	188
<i>Fig. 17 Lewis Overthrust Contact Line</i>	190
<i>Fig. 18 Intercalation at Contact Plane</i>	192
<i>Fig. 19 Double Intercalation at Contact Plane</i>	194
<i>Fig. 20 The Matterhorn</i>	199
<i>Fig. 21 Mixing of Pleistocene and Cretaceous Strata</i>	202
<i>Fig. 22 "Thrust" Plane</i>	204
<i>Fig. 23 A "Deceptive Conformity," or Paraconformity</i>	208
<i>Fig. 24 Double Paraconformity</i>	210
<i>Fig. 25 Flood Debris Near Los Angeles</i>	262
<i>Fig. 26 Marine Terraces</i>	316
<i>Fig. 27 Buried "Forests" in Specimen Ridge</i>	420
<i>Fig. 28 Comparison of Banding Effects</i>	426

interpretation. In these days of intellectual and cultural conformity, real independent thinking seems to be becoming a lost art. A volume such as this offers us the challenge to begin to think carefully and creatively concerning the great issues with which it deals.

Introduction

The question of the historicity and the character of the Genesis Flood is no mere academic issue of interest to a small handful of scientists and theologians. If a worldwide flood actually destroyed the entire antediluvian human population, as well as all land animals, except those preserved in a special Ark constructed by Noah (as a plain reading of the Biblical record would lead one to believe), then its historical and scientific implications are tremendous. The great Deluge and the events associated with it necessarily become profoundly important to the proper understanding of anthropology, of geology, and of all other sciences which deal with historical and pre-historical events and phenomena.

But of even greater importance are the implications of the mighty Flood of Genesis for Christian theology. For that universal catastrophe speaks plainly and eloquently concerning the sovereignty of God in the affairs of men and in the processes of nature. Furthermore, it warns prophetically of a judgment yet to come, when the sovereign God shall again intervene in terrestrial events, putting down all human sin and rebellion and bringing to final fruition His age-long plan of creation and redemption.

But we have come to a day when the world of science and scholarship no longer regards the witness and warnings of the Flood with any seriousness. Men instead have adopted a philosophy of uniformity and evolution with which to interpret both cosmic and human history and with which even to predict and plan the future. Even

evangelical Christians, though still professing belief in the divine validity of Scripture, have often capitulated to uniformitarian¹ scholarship, denying the universality of the Flood and, with the denial, thereby sacrificing its mighty evangelistic witness to a world in rebellion against its Creator.

Our present study therefore has a twofold purpose. In the first place, we desire to ascertain exactly what the Scriptures say concerning the Flood and related topics. We do this from the perspective of full belief in the complete divine inspiration and perspicuity of Scripture, believing that a true exegesis thereof yields determinative Truth in all matters with which it deals.

We accept as basic the doctrine of the verbal inerrancy of Scripture, to which Benjamin B. Warfield has given admirable expression in the following words:

The Church has held from the beginning that the Bible is the Word of God in such a sense that its words, though written by men and bearing indelibly impressed upon them the marks of their human origin, were written, nevertheless, under such an influence of the Holy Ghost as to be also the words of God, the adequate expression of His mind and will. It has always recognized that this conception of co-authorship implies that the Spirit's superintendence extends to the choice of the words by the human authors (verbal inspiration), and preserves its product from everything inconsistent with a divine authorship . . . thus securing, among other things, that entire truthfulness which is everywhere presupposed in and asserted for Scripture by the Biblical writers (inerrancy).²

The second purpose is to examine the anthropological, geological, hydrological and other scientific implications of the Biblical record of the Flood, seeking if possible to orient the data of these sciences within this Biblical framework. If this means substantial modification of the principles of uniformity and evolution³ which currently control the interpretation of these data, then so be it.

¹ Uniformitarianism is the belief that existing physical processes, acting essentially as at present, are sufficient to account for all past changes and for the present state of the astronomic, geologic and biologic universe. The principle of uniformity in present processes is both scientific and Scriptural (Gen. 8:22), but comes into conflict with Biblical revelation when utilized to deny the possibility of past or future miraculous suspension or alteration of those processes by their Creator.

² Benjamin B. Warfield, "The Real Problem of Inspiration," in *The Inspiration and Authority of the Bible*, edited by Samuel G. Craig (Philadelphia: The Presbyterian and Reformed Publishing Co., 1948), p. 173. See also, Edward J. Young, *Thy Word is Truth* (Grand Rapids: Wm. B. Eerdmans Pub. Co., 1957).

³ We use the term "evolution" in the broadest sense; namely, the theory that all

We realize, of course, that modern scholarship will be impatient with such an approach. Our conclusions must unavoidably be colored by our Biblical presuppositions, and this we plainly acknowledge.

But uniformitarian scholarship is no less bound by its own presuppositions and these are quite as dogmatic as those of our own! The assumptions of historical continuity and scientific naturalism are no more susceptible of genuine scientific proof than are Biblical catastrophism¹ and supernaturalism. Furthermore, we believe that certain of the assumptions implicit in evolutionary theory (e.g., tacit denial of the two universal laws of thermodynamics)² are much farther removed from scientific actualities than are our own premises. We believe that a system founded squarely on full confidence in the Scriptures will be found ultimately to be much more satisfying than any other, in its power to correlate scientific data and to resolve problems and apparent conflicts.

We recognize, certainly, that a work of this nature cannot deal comprehensively with all the problems entailed in the formulation of a truly Biblical and scientific catastrophism. The scope of these problems is vast, bearing really upon the whole spectrum of the sciences. The background and special interests of the authors are, on the one hand, the fields of Old Testament interpretation and Biblical criticism and, on the other, the fields of hydraulics, hydrology, and geomorphology. It is hoped that this combination will serve as well as any for a preliminary study³ of the Genesis Flood and its implications.

organisms, man included, have been derived by gradual diversification from common ancestral forms of life, through innate processes of variation and selection, forms which in turn originally were derived by spontaneous generation from inanimate matter.

¹ Biblical catastrophism is the doctrine that, at least on the occasions mentioned in Scripture, God has directly intervened in the normal physical processes of the universe, causing significant changes therein for a time. At the same time, such miraculous intervention acquires significance only against the backdrop of a basic pattern of uniformity.

² Evolution, in the broad sense, implies increasing organization and complexity in the universe and is in effect a doctrine of continuous creation; conversely, the first law of thermodynamics affirms that creation is no longer normally occurring, and the second that the original creation is decreasing in organization and complexity. See pp. 222f.

³ We emphasize, as strongly as possible, that this can only be an exploratory sketch of a vast and complex field of study. It will necessarily be subject to extensive modification and amplification, but we trust that such difficulties of detail as may occur to the reader will not deter him from a genuinely candid consideration of the picture as a whole.

The advice of many others, specialists in different pertinent disciplines, has also been very helpful.

Nevertheless, we are realistic concerning the reception this work may expect, by and large, from evolutionary scientists. We believe that most of the difficulties associated with the Biblical record of the Flood are basically religious, rather than scientific. The concept of such a universal judgment on man's sin and rebellion, warning as it does of another greater judgment yet to come, is profoundly offensive to the intellectual and moral pride of modern man and so he would circumvent it if at all possible.

We hope, however, that those whose confidence, like ours, is centered in the revelation of God, will be encouraged herein to see that a truly Biblical approach will eventually correlate all the factual data of science in a much more harmonious and satisfying way than the uniformitarian assumption can ever do. Because the Creator is also the true Author of Scripture, we believe that the more faithfully we believe His Word, the more effectively shall we be able to advance the frontiers of true knowledge concerning His Creation, exercising in the process the functions of the image of God in man.

Preface to the Second Printing

The authors wish to take this opportunity to thank God for the large measure of favorable response He has seen fit to grant to this volume. Letters have been received from pastors, missionaries, and Christian men of science all over the world, which indicate that the book has helped to meet an urgent need in the realm of Christian apologetics. There are many who agree with us that the time has come when the false presuppositions and implications of organic evolution and geologic uniformitarianism need to be challenged in the name of holy Scripture. We hope that THE GENESIS FLOOD has made a positive contribution in this direction.

Of about twenty published reviews that we have seen thus far, only two have been unfavorable. Certain important implications of these two critical reviews call for clarification at this time. In the first place, the basic argument of this volume is based upon the presupposition that the Scriptures are true (being verbally inspired by God—II Timothy 3:16, II Peter 1:21, John 10:35, etc.). We believe it has been proved that they consistently teach the universality of the great Flood of the days of Noah. It is quite significant, in the light of this, that neither review alluded to above attempted to deal with this Biblical doctrine of the Flood.

In the second place, it seems quite obvious that a misrepresentation of the authors' position on the doctrine of uniformitarianism continues to persist in some quarters. So far from holding that this doctrine, which underlies much of modern scientific theory, is totally invalid, the authors have insisted that "the principle of uniformity in *present* processes is both scientific and Scriptural (Gen. 8:22), but comes into conflict with Biblical revelation when utilized to deny the possibility of *past* or *future* miraculous suspension or alteration of those processes by their Creator" (xx, note 1).

In the third place, we have made every effort to quote our sources in proper context and to avoid attributing our own views to those

whom we have quoted. Having observed these precautions, however, one has a perfect right in polemical writings to quote from one's opponent in order to expose the inconsistency of his position. Full documentation has been given in THE GENESIS FLOOD for each reference, and any reader who may question the propriety or pertinence of any of them is urged to look them up for himself. True Christian scholarship thrives on an open Bible and on fair and open debate.

Finally, we emphasize again that many minor details of our analysis of these problems may require modification in the light of further study, but these will not affect the major conclusions. We therefore urge the reader not to be overly swayed by minor difficulties, but rather to consider candidly the tremendous accumulated weight of Biblical and scientific evidence validating the universal Flood and its geological implications.

In this second printing of THE GENESIS FLOOD, a few minor errors have been corrected, mostly typographical in nature. The general format and pagination remains unchanged.

It is our sincere prayer that God may continue to use this volume for the purpose of restoring His people everywhere to full reliance on the truth of the Biblical doctrine of origins. We are convinced that it is only through a proper understanding of God's Word that men can understand the mysteries of God's world. "With thee is the fountain of life: in thy light shall we see light" (Psa. 36:9).

Henry M. Morris
John C. Whitcomb, Jr.

November 15, 1961

Preface to the Sixth Printing

The authors wish to take this opportunity to thank God for the large measure of favorable response He has seen fit to grant to this volume. Letters have been received from pastors, missionaries, and Christian men of science all over the world, which indicate that the book has helped to meet an urgent need in the realm of Christian apologetics. There are many who agree with us that the time has come when the false presuppositions and implications of organic evolution and geologic uniformitarianism need to be challenged in the name of holy Scripture. We hope that THE GENESIS FLOOD has made a positive contribution in this direction.

Of the forty-five published reviews that we have seen thus far, only a few have been unfavorable. The few critical reviews seem to focus upon two main objections. *One* is the supposed impropriety of questioning the authority of those geologists and other scientists who have concluded that the earth and its life forms have been developing into their present state for billions of years. The *second* is a complaint against our use of documented quotations from various authorities, who themselves would disagree with our basic position, as evidence in support thereof. The *first* criticism implies that no one but a geologist has the right to evaluate a geological theory; the *second* would in effect preclude the use of statements from anyone except authors already in agreement with our position, as this would be "quoting out of context."

Rather than attempting to answer the various specific examples of these objections selected by the reviewers, it will be more to the point to deal with these basic charges in their totality. We believe, of course, that the reviewers have misunderstood what we were saying in the specific examples cited. A more careful reading of the whole book, instead of isolated portions lifted out for criticism, we believe would show that every one of the objections raised is without foundation. However, it is more important to get at the basic issues, and so we confine our attention to the two fundamental objections noted above.

The first point has been discussed at considerable length in the book, and since the reviewers have chosen to ignore our references to this matter, we must emphasize again several things. In the first place, we do not presume to question any of the data of geological *science*. Science (meaning "knowledge") necessarily can deal only with *present* processes, which can be measured and evaluated at the present time; the "scientific method" by definition involves experimental reproducibility. Thus, extrapolation of present processes into the prehistoric past or into the eschatological future is not really science. Such extrapolation necessarily involves assumptions and presuppositions and is therefore basically a philosophy, or even a faith. The assumption of uniformity is one such assumption that can be made, but it is not the only one, and there is no way of *proving* that it is the correct one. The very same data can also be explained in terms of the assumption of Biblical creationism and catastrophism, and it is mainly a matter of one's own judgment and preferences as to which he chooses. We frankly prefer the latter presupposition, on the basis of what we consider wholly adequate grounds centered in the revelation of God in Christ. We believe that the Bible, as the verbally inspired and completely inerrant Word of God, gives us the true framework of historical and scientific interpretation, as well as of so-called religious truth. This framework is one of special creation of all things, complete and perfect in the beginning, followed by the introduction of a universal principle of decay and death into the world after man's sin, culminating in a worldwide cataclysmic destruction of "the world that then was" by the Genesis Flood. We take this revealed framework of history as our basic datum, and then try to see how all the pertinent data can be understood in this context. It would be salutary for the "uniformitarians" to recognize that this is exactly the procedure they follow too, except that they start with the assumption of uniformity (and therefore, implicitly, evolution) and then proceed to interpret all the data to fit into *that* context. Neither procedure is scientific, since we are not dealing with present and reproducible phenomena. Both approaches are matters of faith. It is not a scientific decision at all, but a spiritual one.

In the second place, we emphatically do not question uniformity of the basic laws of physics (e.g., the two laws of thermodynamics) as charged by the reviewers. We strongly emphasized that these laws have been in operation since the *end* of the creation period. The first teaches that no creation is now taking place, and the second enunciates the uni-

versal law of decay. These laws are basic in geology and in all science, and are clearly set forth in Scripture. This is the *true* principle of uniformity. We only question the assumption of uniformity of *rates* of geological and other processes, and even here essentially only as required by Biblical revelation. It is well known that the second law of thermodynamics implies decay but does not say anything about the *rate* of decay. There is nothing fundamentally inviolable about even rates of *radioactive* decay.

Geologists, therefore, must leave the strict domain of *science* when they become *historical* geologists. We repeat that we have *no quarrel whatever* with geological *science*, which in its many disciplines is contributing most significantly to our understanding and utilization of our terrestrial environment and resources. The so-called historical geology, on the other hand, has not changed or developed in any essential particular for over a hundred years, since the days when its basic philosophical structure was first worked out by such non-geologists as Charles Lyell (a lawyer), William Smith (a surveyor), James Hutton (an agriculturalist), John Playfair (a mathematician), George Cuvier (a comparative anatomist), Charles Darwin (an apostate divinity student turned naturalist), and various theologians (Buckland, Fleming, Pye Smith, and Sedgwick). Might we respectfully suggest that, if non-geologists were allowed to develop the standard historical geology, non-geologists might also be permitted to evaluate and criticize it? Historical geology, with its evolutionary implications, has had profound influence on nearly every aspect of modern life, especially in its fostering of an almost universal rejection of the historicity of Genesis and of Biblical Christianity generally. It is not reasonable, therefore, to expect Bible-believing Christians to acquiesce quietly when, in the name of "science," historical geologists attempt to usurp all authority in this profoundly important field of the origin and history of the earth and its inhabitants.

It is at this point that the authors feel that these critical reviewers have been most unfair. As we have stressed repeatedly in our book, the real issue is not the correctness of the interpretation of various details of the geological data, but simply what God has revealed in His Word concerning these matters. This is why the first four chapters and the two appendixes are devoted to a detailed exposition and analysis of the Biblical teachings on creation, the Flood, and related topics. The last three chapters attempt then, in an admittedly preliminary and incom-

plete manner, to explain the pertinent geological and other scientific data in the light of these teachings. The criticisms, however, have almost always centered upon various details of the latter, and have ignored the former and more important matters. The very strong and detailed Biblical evidences for a recent Creation, the universal effects of the Curse, and the worldwide destructive effects of the Deluge, have evidently been neglected as peripheral and inconsequential as far as these reviewers are concerned. Of course, they cite opinions to the effect that various interpretations are possible, etc., but *none ever deals with the actual Biblical evidence.*

The only conclusion that one can draw from this is that the authors and their critics seem to be operating on two entirely different sets of presuppositions. On the one hand, scientific data are interpreted in the light of Biblical revelation; on the other hand, both revelation and the scientific data are interpreted in the light of the philosophic assumption of uniformity.

The second basic criticism of these reviewers is the charge that we have supported our position by quotations taken out of context, and that these quotations are consequently misleading. To this we would only suggest that skeptical readers look up the references for themselves. We have been careful to give full documentation for every reference, for just this reason. We flatly reject the innuendo that we have tried to give the impression that the authorities cited agree with our basic position or even with the particular argument we are attempting to illustrate by each quotation. We are of course trying to show in each case that the actual scientific data can be interpreted just as well or better in terms of the creation-catastrophe framework. Since it would be unrealistic to expect most readers to accept our description of the particular phenomenon under discussion simply on our own authority, we use instead the works of recognized geologists of the orthodox school. No implication is intended, unless explicitly so stated, concerning the beliefs of the particular writer quoted. We believe the quotation in each case speaks for itself concerning the issue at hand. This, of course, is standard procedure in scientific dialogue and argumentation. The latter would be quite impossible were writers expected to limit their citations to recognized authorities who already agreed with their position.

Space does not permit a detailed discussion of the specific examples which the reviewers give in support of their charge of misleading quota-

tions. However, we deny not only the general charge but also the validity of the individual examples. We believe a *careful* reading of both the original articles and our use of portions of them in our discussions will verify their pertinence and contextual soundness as they stand. We of course readily acknowledge our fallibility. When and if legitimate weaknesses or mistakes are pointed out, we hope that we shall be willing to acknowledge and revise them. As we have tried repeatedly to stress in the book, our specific discussions of individual geologic problems are tentative and subject to continuing re-evaluation with further study, but these problems do not, and cannot be allowed to, raise questions concerning the basic framework of Biblical revelation within which they must be understood.

It is our sincere prayer that God may continue to use this volume for the purpose of restoring His people everywhere to full reliance on the truth of the Biblical doctrine of origins. We are convinced that it is only through a proper understanding of God's Word that men can understand the mysteries of God's world. "With thee is the fountain of life: in thy light shall we see light" (Psa. 36:9).

Henry M. Morris
John C. Whitcomb, Jr.

May 25, 1964

for such a condition, continuing throughout an entire year, would contradict all known laws of water action.¹ Albertus Pieters, a more recent advocate of the limited-Flood view, frankly admits the problems that this view entails:

If the relative elevation of the continents above the sea level was as at present, and if the "mountains of Ararat" mentioned as the resting place of the ark are the table land now known by that name, the flood must have been universal or nearly so; for that region is now 5,000 feet above sea level, and an inundation sufficient to cover it would cover the whole world, with the exception of the highest mountain ranges. But it is not at all certain that the levels have not changed.²

Therefore, we conclude that the argument based upon a limited usage of universal terms must be rejected. It does not do justice to the context of the Flood narrative, it fails to cope with the physical phenomena described in those chapters, and it has encouraged Christian thinkers to take utterly unwarranted liberties with the text of Scripture. Our main concern, as honest exegetes of the Word of God, must not be to find ways of making the Biblical narratives conform to modern scientific theories. Instead, our concern must be to discover exactly what God has said in the Scriptures, being fully aware of the fact that modern scientists, laboring under the handicap of non-Biblical philosophical presuppositions (such as materialism, organic evolution, and uniformitarianism), are in no position to give us an accurate reconstruction of the early history of the earth and its inhabitants.

¹ It is of interest to note that his co-worker, C. F. Keil, was strongly opposed to the local-Flood concept: "A flood which rose 15 cubits above the top of Ararat could not remain partial, if it only continued a few days, to say nothing of the fact that the water was rising for 40 days, and remained at the highest elevation for 150 days. To speak of such a flood as partial is absurd. Even if it broke out at only one spot, it would spread over the earth from one end to the other, and reach everywhere to the same elevation. However impossible, therefore, scientific men may declare it to be for them to conceive of a universal flood of such height and duration in accordance with the known laws of nature, this inability on their part does not justify anyone in questioning the possibility of such an event being produced by the omnipotence of God." *Op. cit.*, p. 146.

² Pieters, *op. cit.*, p. 119. J. J. Stewart Perowne, another advocate of a limited Flood, was embarrassed by the same problem: "On reading this narrative it is difficult, it must be confessed, to reconcile the language employed with the hypothesis of a partial deluge . . . The real difficulty lies in the connecting of this statement [7:19] with the district in which Noah is supposed to have lived, and the assertion that the waters prevailed fifteen cubits upward." *Loc. cit.*, pp. 2181-2182. Not until Christian scholars show a willingness to break completely with uniformitarian geology will they begin to understand the full significance of the Genesis Flood.

NOAH AND THE ANIMALS

Another familiar cluster of objections to the doctrine of a universal Flood gathers around the problem of how the animals were brought into the Ark and cared for during the 371 days of the Flood. Conservative Christians of the local-Flood school believe that collecting a few domesticated animals in Mesopotamia and caring for them in the Ark would have been a relatively simple matter. But to gather and care for two of *every* kind of land animal in the world would be a different matter. It has been repeatedly asserted by these men that even if Noah could have collected such a vast number of animals, the Ark could not have contained them, nor could they have been properly cared for by eight persons for an entire year.

Gathering the Animals to the Ark

Since the year 1840, when John Pye Smith first set forth these objections,¹ writers of the limited-Flood school have outdone one another in an effort to depict the supposed absurdities of such a situation. For example, Robert Jamieson wrote in 1870:

On the hypothesis, therefore, of a universal flood, we must imagine motley groups of beasts, birds, and reptiles, directing their way from the most distant and opposite quarters to the spot where Noah had prepared his ark—natives of the polar regions and the torrid zones repairing to sojourn in a temperate country, the climate of which was unsuited alike to arctic and equatorial animals. What time must have been consumed! what privations must have been undergone for want of appropriate food! what difficulties must have been encountered! what extremes of climate must have been endured by the natives of Europe, America, Australia, Asia, Africa, and the numerous islands of the sea! They could not have performed their journeys unless they had been miraculously preserved.²

Twenty years later, Marcus Dods added some finishing touches to this caricature of Genesis by suggesting that the animals of Australia, "visited by some presentiment of what was to happen many months after, selected specimens of their number, and that these specimens

¹ John Pye Smith, *The Relation Between the Holy Scriptures and Some Parts of Geological Science*, p. 145.

² Robert Jamieson, *Critical and Experimental Commentary*, I, 99.

... crossed thousands of miles of sea . . . singled out Noah by some inscrutable instinct, and surrendered themselves to his keeping."¹

However, by the time the Flood controversy had reached this stage, several important fallacies became apparent in the arguments which Marcus Dods and others were setting forth in refutation of the universal Flood view. For one thing, it was recognized on all sides that there was definite danger involved in carrying this type of logic too far—the danger of removing every supernatural element from the Genesis Flood and explaining everything on a purely naturalistic basis. One defender of a limited Flood who clearly saw this danger was J. Cynddylan Jones. In his "Davies Lecture" for 1896, he took occasion to rebuke Marcus Dods:

That doubtless is the way Dr. Dods would set about it . . . "get the animals to select specimens of their number," though the learned divine does not condescend to tell us whether it would be by ballot or by show of hands. However, the Supreme Being is not necessarily confined to Dr. Dods' methods. Even if the Deluge were universal, the difficulties enumerated would not prove insuperable to the Almighty . . . Such writing ignores the supernatural character of the episode, endeavors to explain it on naturalistic principles, and thereby comes very near holding up to ridicule Him who is God blessed for evermore.²

An equally serious fault in this type of reasoning is that it begs the question of the extent and effects of the Deluge. It assumes, for example, that climatic zones were exactly the same before the Flood as they are now, that animals inhabited the same areas of the world as they do now, and that the geography and topography of the earth continued unchanged. But on the assumption of a universal Deluge, all these conditions would have been profoundly altered.³ Arctic and desert zones may never have existed before the Flood; nor the great intercontinental barriers of high mountain ranges, impenetrable jungles, and open seas (as between Australia and Southeast Asia, and between Siberia and Alaska). On this basis, it is quite probable that animals were more widely distributed than now, with representatives

¹ Marcus Dods, *The Book of Genesis*, Vol. I of *The Expositor's Bible*, ed. W. Robertson Nicoll (4th ed.; London: Hodder and Stoughton, 1890), p. 55.

² J. Cynddylan Jones, *Primeval Revelation: Studies in Genesis I-VIII* (New York: American Tract Society, 1897), p. 356.

³ See discussion of antediluvian geography and climate, pp. 121-122; 240-245; 287-293.

of each created kind of land animal living in that part of the earth where Noah was building the Ark.

The Capacity of the Ark

Another aspect of this problem is the capacity of the Ark for carrying two of every kind of land animal and seven of every "clean beast" (Gen. 7:2-3).¹ Realizing full well that the Ark was a gigantic structure, advocates of a local Flood have had to resort to various methods of "multiplying the species" in order to make it impossible for any ark, however large, to carry two of each kind. One method has been to take the phrase "seven and seven" (Gen. 7:2-3) to mean fourteen, instead of "by sevens," and to classify all the birds of the heavens as "clean." Jan Lever, Professor of Zoology at the Free University of Amsterdam, has done this and comes to the conclusion that "of the clean animals and of the birds there were seven pairs, of the unclean one pair. There are known at present about 15,000 species of birds. This means that there were 210,000 birds in the ark."²

But even assuming that there were 15,000 different species of birds in the days of Noah,³ Dr. Lever has put 180,000 too many birds into the Ark! The Hebrew phrase "seven and seven" no more means fourteen than does the parallel phrase "two and two" (Gen. 7:9,15) mean four! Furthermore, the context demands that the birds were to be classified into "clean" and "unclean" just like the other animals. Leupold explains:

The Hebrew expression "take seven seven" means "seven each" (Koenig's *Syntax* 85; 316b; Gesenius' *Grammatik* rev. by Kautzsch 134q). Hebrew parallels support this explanation. In any case, it would be a most clumsy method of trying to say "fourteen." Three pairs and one super-numerary make the "seven." As has often been suggested, the super-numerary beast was the one Noah could conveniently offer for sacrifice after the termination of the Flood. In verse 3 the idea of "the birds of the heavens" must, of course, be supplemented by the adjective "clean," according to the principle laid down in verse 2. The birds are separately

¹ See above, pp. 12-13, for discussion of which animals were to be included in the Ark.

² Jan Lever, *Creation and Evolution* (Grand Rapids: Grand Rapids International Publications, 1958), p. 17.

³ But see Mayr's tabulation, below, p. 68, listing only 8,600 species of birds.

mentioned so that Noah might not be left to his own devices in fixing the limits of what verse 2 included.¹

Another common method of "multiplying the species" has been to identify the "species" of modern taxonomy with the "kinds" of Genesis. John Pye Smith seemed to find much delight in pointing out that the Ark was too small for such a cargo, for "the innumerable millions upon millions of animalcules must be provided for; for they have all their appropriate and diversified places and circumstances of existence."²

But a hundred years of further study in the science of zoology has brought to light some interesting facts concerning the amazing potentialities for diversification which the Creator has placed within the Genesis kinds. These "kinds" have never evolved or merged into each other by crossing over the divinely-established lines of demarcation;³ but they have been diversified into so many varieties and sub-varieties (like the races and families of humanity) that even the greatest taxonomists have been staggered at the task of enumerating and classifying them.⁴

Frank Lewis Marsh has prepared a diagram (see Fig. 4) to illustrate his conception of how some of the typical *baramins* (from *bara*—"created," and *min*—"kind") might have become diversified before and after the Flood. He points out that over 500 varieties of the sweet pea have been developed from a single type since the year 1700; and that over 200 distinct varieties of dogs, as different from each other as the dachshund and the collie, have developed from a very few wild dogs. In further discussing the matter, Dr. Marsh writes:

In the field of zoology a very good illustration of descent with variation is furnished by the domestic pigeon. The diversity in form and temperament to be found among strains of pigeons would stagger our belief in their com-

¹ Leupold, *op. cit.*, p. 290. Birds are specifically divided into "clean" and "unclean" kinds in Leviticus 11, along with the other animals.

² John Pye Smith, *op. cit.*, p. 144.

³ Robert E. D. Clark has recently concluded: "Every theory of evolution has failed in the light of modern discovery and, not merely failed, but failed so dismally that it seems almost impossible to go on believing in evolution!" *Darwin: Before and After* (Grand Rapids: Grand Rapids International Publication, 1958), p. 145.

⁴ See Theodosius Dobzhansky, *Genetics and the Origin of Species* (3rd ed.; New York: Columbia University Press, 1951), pp. 3-10.

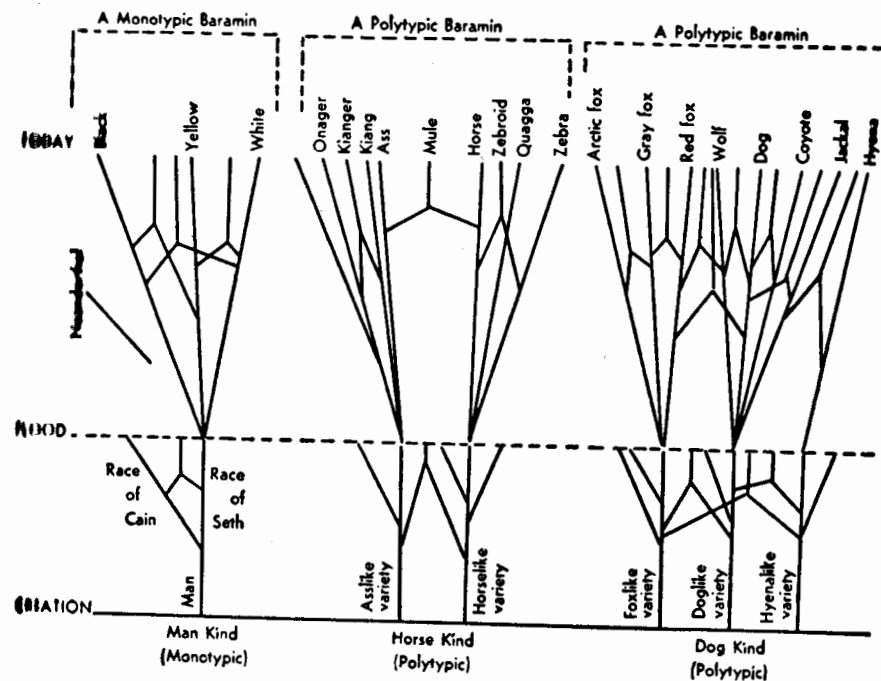


Figure 4. DIAGRAM OF THREE GENESIS KINDS.

(From Frank L. Marsh, *Evolution, Creation, and Science*, p. 179.

mon origin if we did not know that they have all been developed from the wild rock pigeon of European coasts, *Columbia livia*. It is extremely interesting to see the variations from the ancestral form which are exhibited in such strains as the pouter, the leghorn runt, the fantail, the tumbler, the owl, the turbit, the swallow, the carrier, the nun, the jacobin, and the homer. Different "species" names and possibly even different "generic" names would certainly be assigned to some of these if it were not known that they are merely strains of a common stock.¹

It is unwarranted to insist that all the present species, not to mention all the varieties and sub-varieties of animals in the world today, were represented in the Ark. Nevertheless, as a gigantic barge, with a volume of 1,396,000 cubic feet (assuming one cubit = 17.5 inches), the Ark had a carrying capacity equal to that of 522 standard stock

¹ Frank L. Marsh, *Evolution, Creation, and Science* (Washington: Review and Herald Pub. Assoc., 1947), pp. 29, 351.

cars as used by modern railroads or of eight freight trains with sixty-five such cars in each!¹

Ernst Mayr, probably the leading American systematic taxonomist, lists the following numbers for animal species according to the best estimates of modern taxonomy:²

Mammals	3,500
Birds	8,600
Reptiles & Amphibians	5,500
Fishes	18,000
Tunicates, etc.	1,700
Echinoderms	4,700
Arthropods	815,000
Mollusks	88,000
Worms, etc.	25,000
Coelenterates, etc.	10,000
Sponges	5,000
Protozoans	15,000

TOTAL ANIMALS 1,000,000

In the light of this recent estimate, one wonders about "the innumerable millions upon millions of animalcules" which Pye Smith insisted the Ark had to carry, especially when we consider that of this total there was no need for Noah to make any provision for *fishes* (18,000 "species"), *tunicates* (marine chordates like sea squirts—1,700), *echinoderms* (marine creatures like starfishes and sea urchins—4,700), *mollusks* (mussels, clams, oysters, etc.—88,000), *coelenterates* (corals, sea anemones, jelly fishes, hydroids—10,000), *sponges* (5,000), or *protozoans* (microscopic, single-celled creatures, mostly marine—15,000). This eliminates 142,000 "species" of marine creatures. In addition, some *mammals* are aquatic (whales, seals, porpoises, etc.); the *amphibians* need not all have been included; a large number of the *arthropods* (815,000 "species"), such as lobsters, shrimps, crabs, water fleas, and barnacles, are marine creatures, and the insect "species" among arthropoda are usually very small; and

¹ Lionel S. Marks, ed., *Mechanical Engineers' Handbook* (New York: McGraw-Hill Book Co., Inc., 1958, p. 11:35), states that the standard stock car contains 2670 cu. ft. effective capacity. Also see the "Car Builders' Cyclopedia of American Practice," Simmons-Boardman Pub. Co., 1949-51, p. 121.

² Cited in Dobzhansky, *op. cit.*, p. 7.

many of the 25,000 "species" of *worms*, as well as many of the insects, could have survived outside of the Ark. When we consider further that Noah was not required to take the largest or even adult specimens of each "kind" and that comparatively few were classified as "clean" birds and beasts, the problem vanishes. Jan Lever completely misses the mark when he states that "the lowest estimate of the number of animals in the ark then would be fully 2,500,000."¹

For all practical purposes, one could say that, at the outside, there was need for no more than 35,000 individual vertebrate animals on the Ark. The total number of so-called species of mammals, birds, reptiles and amphibians listed by Mayr is 17,600, but undoubtedly the number of original "kinds" was less than this. Assuming the average size of these animals to be about that of a sheep (there are only a very few really large animals, of course, and even these could have been represented on the Ark by young ones), the following will give an idea of the accommodations available:

The number of animals per car varies greatly, depending on the size and age of the animals. . . . Reports of stock cars and railroads show that the average number of meat animals to the carload is for cattle about 25, hogs in single deck cars about 75, and sheep about 120 per deck.²

This means that at least 240 animals of the size of sheep could be accommodated in a standard two-decked stock car. Two trains hauling 73 such cars each would thus be ample to carry the 35,000 animals.³ We have already seen that the Ark had a carrying capacity equivalent to that of 522 stock cars of this size! We therefore find that a few simple calculations dispose of this trivial objection once and for all.

With respect to the survival of plants through the Flood, we have this comment from Walter E. Lammerts, consultant in the Horticultural Research Division of Germain's, Inc.:

¹ Lever, *op. cit.*, p. 17.

² H. W. Vaughan: *Types and Market Classes of Live Stock* (Columbus, Ohio: College Book Co., 1945) p. 85.

³ Lest anyone be concerned about the space occupied by the insects, worms, and similar small creatures, let it be noted that, if the space occupied by each individual averaged 2 inches on the side, only 21 more cars of this size would suffice for over a million individuals. Extinct animals such as the dinosaurs may also have been represented on the Ark, probably by very young animals, only to die out because of hostile environmental conditions after the Flood; it seems more likely, however, that animals of this sort were not taken on the Ark at all, for the very reason of their intended extinction.

I am convinced that many thousands of plants survived either as floating vegetation rafts or by chance burial near enough to the surface of the ground for asexual sprouting of new shoots. I am, of course, aware that objections could be raised on the idea that long exposure to salt water would be so harmful to any vegetation as to either kill it or so reduce its vitality as to make root and new shoot formation impossible. However, I see no reason at all to postulate that the salt content of the ocean at the time of the flood was as high as it is now. In fact, on the basis of the canopy theory, we would most certainly expect that the salt content of the ocean before the flood would be diluted, perhaps by one-half. Naturally, during the first few hundred years after the flood the salt content of the ocean would again be rather rapidly raised because of the much above normal drainage of the land surface.¹

Marsh further suggests that:

There was doubtless a considerable number of plants which were carried through the Flood in the form of seeds which composed a portion of the large store of food cached in the ark. But most of the vegetation sprang up here and there wherever the propagules were able to survive the Flood.²

Caring for the Animals in the Ark

Granting, then, that the Ark was large enough to carry two of every kind of land animal, how could Noah and his family have cared for them during the year of the Flood? Ramm fears that "the task of carrying away the manure, and bringing food would completely overtax the few people in the ark," and quotes F. H. Woods in the *Hastings Encyclopedia of Religion and Ethics* to the effect that not even the most skilled modern zoologists could have coped with such a task.³ Arthur Custance multiplies the difficulties even more:

Many commentators have calculated the size of the Ark and the total number of species in the world, and spoken freely of its capacity to carry them. What they do not always remember is that such animals need attention and food, the carnivorous ones, if they existed as such, requiring meat which would have to be stored up for one whole year. In any case, a sufficient supply of water for drinking would probably have to be taken on board since the mingling of the waters in a worldwide Flood would presumably render it unfit to drink . . . It is rather difficult to visualize a

¹ Letter from W. E. Lammerts, Livermore, Calif., Nov. 27, '57.

² Marsh, *op. cit.*, p. 213.

³ Ramm, *op. cit.*, p. 246.

Flood of worldwide proportions but with so little turbulence that four men (perhaps helped by their womenfolk) were able to care for such a flock. It would take very little unsteadiness to make the larger animals almost unmanageable. It becomes even more difficult to conceive how proper provision could have been made for many animals which spend much of their time in the water, such as crocodiles, seals, and so forth.¹

Since the Bible does not give us details on these points, we are of course unable to speak dogmatically as to the methods which were used in caring for the animals. We suggest the reasonable possibility, however, that the mysterious and remarkable factor of animal physiology known as *hibernation* may have been involved. There are various types of dormancy in animals, with many different types of physiologic and metabolic responses, but it is still an important and widespread mechanism in the animal kingdom for surviving periods of climatic adversity.

Hibernation and estivation occur in every group of vertebrates save birds, and its pre-disposing causes, immediate and remote, are by no means uniform.²

Hibernation is usually associated with "winter sleep," estivation with escape from summer heat and drought. Other factors also apparently are often involved, such as food shortage, carbon dioxide in the environment, and accumulation of fat. Practically all reptiles and amphibians have the capacity of hibernation. Mammals, being warm-blooded, do not have as great a need for it, and so at present, relatively few practice it. Nevertheless, it is probable that the latent ability to do so is present in practically all mammals.

The zoological dispersion of hibernation among mammals is not especially illuminating, since closely allied forms may differ radically in this

¹ Custance, *op. cit.*, pp. 19-20. May we suggest at least that Noah may have obtained drinking water from the rain that fell? Custance imagines another difficulty when he says that the "rarified atmosphere" at elevations above that of Mount Everest, if the Flood covered the mountains, would "render all but a few creatures insensible in a very few moments for lack of oxygen" (*op. cit.*, p. 9). He particularly expresses concern about Noah and his sons having to climb between the ark's three decks at such high elevations! He of course has overlooked the elementary fact that atmospheric pressure depends on elevation *relative to sea level*. The air column above the raised sea level during the Flood was just as high, and the resulting sea level atmospheric pressure just as great, as the present sea level pressure.

² W. P. Pycraft: "Hibernation," article in *Encyclopedia Britannica*, 1956, Volume 11, p. 539.