

Vol 6 # 1-2, 1977

ÖU

# SPECTRUM

a quarterly journal  
of the association  
of adventist forums



*SPECTRUM* is a journal established to encourage Seventh-day Adventist participation in the discussion of contemporary issues from a Christian viewpoint, to look without prejudice at all sides of a subject, to evaluate the merits of diverse views, and to foster Christian intellectual and cultural growth. Although effort is made to ensure accurate scholarship and discriminating judgment, the statements of fact are the responsibility of contributors, and the views individual authors express are not necessarily those of the editorial staff as a whole or as individuals.

# SPECTRUM

The Association of Adventist Forums is a nonsubsidized, non-profit organization for which gifts are deductible in the report of income for purposes of taxation. The publishing of *SPECTRUM* depends on subscriptions, gifts from individuals, and the voluntary efforts of the contributors and the staff.

## ASSOCIATION OF ADVENTIST FORUMS

### OFFICERS

#### PRESIDENT

ERNEST J. PLATA  
Silver Spring, Maryland

#### VICE PRESIDENT AT LARGE

RICHARD C. OSBORN  
Takoma Park, Maryland

#### VICE PRESIDENT FOR FINANCE

RONALD D. COPLE  
Silver Spring, Maryland

#### VICE PRESIDENT FOR DEVELOPMENT

WALTER B. DOUGLAS  
Berrien Springs, Michigan

#### EXECUTIVE SECRETARY

G. WILLIAM CAREY  
Silver Spring, Maryland

### BOARD MEMBERS

GLENN E. COE  
West Hartford, Connecticut

MOLLEURUS COUPERUS  
Loma Linda University

JOHN R. JONES  
Nashville, Tennessee

JOSEPH MESAR  
Brighton, Massachusetts

GRANT N. MITCHELL  
Davis, California

KATHLEEN MITCHELL  
Collegedale, Tennessee

NATHAN MOORE  
College Place, Washington

ROSALIE ANDERSON THORN  
Loma Linda, California

### EDITORIAL BOARD

MOLLEURUS COUPERUS, *Chairman*  
Loma Linda University

FRITZ GUY  
Loma Linda University

GARY G. LAND  
Andrews University

MAX G. PHILLIPS  
Pacific Press Publishing Association

ERNEST J. PLATA  
Silver Spring, Maryland

JACK W. PROVONSHA  
Loma Linda University

ADA L. TURNER  
Loma Linda University

VERNE V. WEHTJE  
Pacific Union College

### SPECTRUM EDITORIAL STAFF

MOLLEURUS COUPERUS, EDITOR

FRITZ GUY, ASSOCIATE EDITOR

ADA L. TURNER, EXECUTIVE EDITOR

GARY G. LAND, BOOK REVIEW EDITOR

JERILYN EMORI, EDITORIAL ASSOCIATE

### CONSULTING EDITORS

DONALD E. HALL  
California State College, Sacramento

MAX G. PHILLIPS  
Pacific Press Publishing Association

JACK W. PROVONSHA  
Loma Linda University

VERNE V. WEHTJE  
Pacific Union College

### CONTRIBUTING EDITORS

GODFREY T. ANDERSON  
Loma Linda University

JAMES S. BARCLAY  
Western Springs, Illinois

ROSS O. BARNES  
Walla Walla College, Washington

C. E. BRADFORD  
Washington, D. C.

JONATHAN M. BUTLER  
Union College, Nebraska

JAMES J. C. COX  
Andrews University, Michigan

E. GILLIS ERENIUS  
Stockholm, Sweden

JORGEN HENRIKSEN  
North Reading, Massachusetts

ERIC A. MAGNUSSON  
Avondale College, Australia

WINFRIED NOACK  
Marienhoehe Missionary Seminary, Germany

SVEND OVERLADE  
Teachers College, Odense, Denmark

ROLAND A. PEREZ  
Stanford University

JOHN PYE  
Pennant Hills, New South Wales, Australia

CALVIN B. ROCK  
Oakwood College, Alabama

J. PAUL STAUFFER  
Loma Linda University

STANLEY G. STURGES  
Dayton, Ohio

STUART A. TAYLOR  
Harvard University

RON W. WALDEN  
Yale University

BENJAMIN R. WYGAL  
Florida Junior College, Jacksonville

SPECTRUM is published quarterly (content © 1975) and second-class postage paid at Loma Linda, California, by the Association of Adventist Forums. □ Direct correspondence to SPECTRUM, Box 886, Loma Linda, California 92354 — *typescript, letter*, or request for *permission to quote* to attention of the EDITOR; *subscription or change of address* (with latest label) to the CIRCULATION MANAGER; *review* to the BOOK REVIEW EDITOR. □ Rates: one year \$10; single copy \$3; double issue \$5; remit by accompanying check payable to the Association of Adventist Forums.

ALAN P. DAVIES	4	POEM: The Wafer
LAWRENCE T. GERATY	5	The Genesis Genealogies as an Index of Time
RICHARD M. RITLAND STEPHEN L. RITLAND	19	The Fossil Forests of the Yellowstone Region
JAMES L. SPANGENBERG	67	The Ordination of Women: Insights of a Social Scientist
ROLAND CHURCHMAN	74	That Wedding Ring
		DISCUSSION: The Knowledge of Faith Perspective and Tension with Faith and Reason
LARRY M. LEWIS	77	
DALTON D. BALDWIN	80	Reason and Will in the Experience of Faith
ERIC D. SYME	84	The Gift of Reason and the Aid of Revelation
WALTER R. HEARN	87	POEM: Scientist's Psalm
		COMMENT AND RESPONSE:
E. ROBERT REYNOLDS	90	COMMENT: The Crucial Question
RICHARD RIMMER	94	COMMENT: Evidence or Conjecture?
DONALD E. HALL	97	RESPONSE: E Pur Si Muove
		REVIEWS:
HARRISON S. EVANS	100	Psychotherapy and Possession
RAY HEFFERLIN	102	Aspects of Science and Religion
INGEMAR LINDEN NORVAL F. PEASE	106	The Prophet of Destiny?
JONATHAN M. BUTLER	111	Notes on Contributors

## *The Wafer*

ALAN P. DAVIES

4

We have the wafer on the plate.

Too late

We run to you,

O maciated Christ upon

The cross.

What loss

We suffer at communion.

We do not see your blood

In drops

Or stop

To think that food

Is flesh. We gorge

Ourselves

On morsels.

We starve to death on bread.

# The Genesis Genealogies as an Index of Time

5

LAWRENCE T. GERATY<sup>1</sup>

The age of the earth and the antiquity of man are of no particular theological import in and of themselves, though theologians have become interested in the subject because of the purported discrepancy between the biblical view of these periods and that now held by most modern scientists. Is this conflict real or imagined?

One way of approaching the question is to take a careful look at what the Bible does or does not say about the period of man's existence on the earth.

For generations, simple Christians have supposed that the Bible allowed only a 6,000-year period for the duration of human history. There was nothing illogical about that supposition. As long as there was no evidence to the contrary, a 6,000-year history for man based largely on the prima-facie impressions of the Genesis genealogies was eminently reasonable. And this belief was not restricted to the simple. No less a thinker than Sir Isaac Newton accepted it implicitly when in his study of ancient chronology he took the Egyptians to task for their claims that made the pharaohs go back "some thousands of years older than the world."<sup>2</sup>

It is not surprising, then, that this supposition became fixed in formal chronological schemes, some of which have become so traditional as to be given a place in the margins of our Bibles since 1679. The most influential of these schemes was the one worked out by Archbishop James Ussher in his *Annales Veteri et Novi Testamenti* (1650-54). Bishop John Lightfoot refined Ussher's date and found that Adam was created on October 23, 4004 B.C., at 9:00 a.m., forty-fifth meridian time! This led E. T. Brewster to quip, "Closer than this, as a cautious scholar, the Vice-Chancellor of Cambridge University did not venture to commit himself."<sup>3</sup>

## EARLY SCIENTIFIC DISCOVERIES

Why do most scholars today reject such startlingly exact conclusions of a bygone generation of biblical students? The data that caused a reevaluation came first from the natural and artifactual world of man. During the nineteenth century, for instance, human stone tools were found in association with the remains of extinct animals — certain evidence for the antiquity of man. But how old was old? Without written records, how could these finds be dated?<sup>4</sup>

6

The recently developed science of geology offered a ready approach. As a means of ordering their discoveries, geologists followed the principle of stratigraphic succession; that is, when successive strata or layers are observed in position, the underlying ones are the earliest. Using this principle, and the characteristic remains of extinct plants and animals within the strata (the type fossils), geologists established a succession of geological periods or epochs that gradually came to be extended to cover the world as a whole.

Archaeologists soon realized that the layers of deposit on archaeological sites where human habitation had occurred could be studied in the same way. As the centuries would pass, successive occupations followed one another at the same site (usually chosen for its access to fresh water and its defensibility), each marked by its own stratum like the layers of a cake. All the archaeologist had to do, in theory at least, was to peel off these layers in reverse order from the way they were deposited. In this manner, in terms of the successive strata, a coherent sequence of occupation for each site could be worked out. And by allowing these successive layers and the finds in them to be set in chronological order, the archaeologist provided the first requirement for effective dating: a sound sequence. This stratigraphic method remains today the essential basis for all archaeological excavation. So far, however, the method has produced only a relative chronology based on sequence, not an absolute one.

Another complementary approach to dating archaeological finds was worked out as early as 1819 by Christian Thomsen, the keeper of antiquities of the National Museum of Denmark (at Copenhagen). Often called the Three Age System, it at once became the basic method by which museum curators set their collections in order. It proposed the division of the prehistoric past into three ages — Stone, Bronze, and Iron — depending on which material was in dominant use for human tools. This theoretical subdivision, accomplished through the study and classification of museum collections, was demonstrated in practice by Thomsen's successor, J. J. A. Worsaae, who showed stratigraphically that finds of bronze were indeed later than the period when stone alone was used, and so on. This simple system allowed archaeological finds to be placed in the approximate period; and despite subsequent advances and criticisms, Paleolithic, Neolithic,



Bronze Age, and Iron Age are still used today as convenient general terms. Again, however, this was a method effective only in arranging finds in terms of a relative chronology. Dating finds in terms of years now became a central problem for pre-history.

Geological methods of a different kind offered some hope of dating absolutely. For instance, it was possible to observe the present rate of deposition in the sediments at the bottom of lakes and rivers. Assuming that these rates had remained roughly constant, geologists could estimate how long the processes had been in operation in particular cases; and thus they could date the beginning of the formation of various deposits.

7 Sir Arthur Evans, whose excavations brought to light the Minoan civilization of Crete, employed this same principle in estimating the date of the first Neolithic settlement at Knossos in Crete. Since the *duration* of the Bronze Age Minoan period was known through cross-dating with Egypt, he was able to calculate the period's rate of deposition by measuring the depth of the debris that had accumulated there as a result of human occupation. Obtaining a figure of three feet per millennium and assuming the same rate for Neolithic times, Evans used the latter's great depth of deposit to suggest a date between 12,000 and 10,000 B.C. for the first Neolithic settlement. The weakness of this method is readily apparent. It is the untested assumption that the rate of deposition has always been constant.

A more sensitive and ingenious technique was developed in Sweden in 1912 by Baron Gerhard de Geer. He studied the annual deposits of sediment (called *varves*) left by the spring meltwaters of glaciers. There were (and remain) problems of tying in the more recent varves with well-dated historical events so as to give a modern fixed point from which the chronology could be extended earlier and earlier back in time — and of course varves are found only in areas on the fringe of glaciers or ice sheets. But the beauty of the method is that it gives a result directly in years, since varve deposition is an annual event. De Geer's work, therefore, remains of real value today.

Before the development of dating techniques such as radiocarbon dating, these methods based on depth or regularity of debris or sediment deposition were the only ones available for setting absolute dates for the early period of man's occupation of the earth. As I have mentioned, however, there are problems of accuracy with these methods. Furthermore, they appear to be useful only for periods before the Neolithic, Bronze, and Iron Ages.

#### ANCIENT NEAR EASTERN CHRONOLOGY

For periods not mentioned, the only really reliable way of dating events was from written records left by the great civilizations of the Mesopotamian and Nile

River Valleys, which in some cases extend as far back as about 3,000 B.C. These records, continually being discovered by archaeologists, are written, of course, in various ancient Near Eastern languages and scripts (each of which has its own inner evolution and development) and have put Mesopotamian and Egyptian chronology on a relatively sound footing. This does not mean that no revision of currently held dates is possible. But it does mean that no drastic revision appears to be possible; ancient Near Eastern chronology, in its broad outline, has reached a stage of relative stabilization.<sup>5</sup>

The current framework for the chronology of ancient Egypt is the system of thirty-one dynasties covering the entire Egyptian Kingdom from its earliest beginnings down to the conquest of Egypt by Alexander the Great in 332 B.C.<sup>6</sup> Passed on to us originally by Manetho, an early third-century B.C. Egyptian priest, it has been revised and corrected in detail, but in general retained for convenience.

8

Several important categories of evidence contribute to this framework. Most important are (a) the king lists, among which are the Turin Royal Canon, whose long list of mortal kings begins with Menes, the first king, and extends, with gaps, through the Second Intermediate Period in the sixteenth century B.C. (giving us, however, the summation figure of 955 years for the time-span between the First and Eighth Dynasties, for instance); (b) the Palermo Stone and related fragments, which together list consecutive regnal years and certain of their events grouped under the name of the ruling kings down through the Fifth Dynasty; (c) and the dynastic temple inscriptions, the best known and preserved of which is that of Seti I of the Nineteenth Dynasty in Abydos listing fifty-six kings in order from the First through the Nineteenth Dynasties. To correct mistakes and fill in gaps, Egyptologists use contemporaneous inscriptions, both royal and private. The latter naturally take precedence over the former, since they tend to be straightforward economic documents rather than propagandistic annals.

The framework thus obtained must then be checked against the increasing numbers of synchronisms with Western Asia. For instance, if the pharaoh met a Mesopotamian monarch on the battlefield or wrote him a letter, obviously they were contemporaries.

Then there are also inscriptions which record observed astronomical events that can be used to give highly accurate dates in terms of our own calendar. The earliest and most important of these recorded astronomical events, a heliacal rising of the star Sothis (known today as Sirius), occurred in the seventh year of Sesostris III, who reigned in the Twelfth Dynasty. Enough information is given to enable scholars who are acquainted with the Egyptian solar calendar to date this astronomical phenomenon with some confidence to 1872 B.C. In 1945, Lynn H. Wood, of the Seventh-day Adventist Theological Seminary, reexamined this

evidence, taking into account new texts containing lunar observations made during this dynasty, and was able to show that the beginning of the Twelfth Dynasty (or Middle Kingdom) could be pinned down to 1991 B.C.<sup>7</sup>

This, in fact, is the earliest fixed calendrical date in human history. Though some uncertainties of detail make possible an error of a decade or so, it is nevertheless a date which Egyptologists accept with considerable confidence.

As I have already mentioned, the Turin Royal Canon reports a total duration for the Old Kingdom of 955 years. Though certain scholars think this figure may be inaccurate by as much as two centuries, if it is accepted and one adds the 150 years required to account for the events of the First Intermediate Period (intervening between the Old and Middle Kingdoms), the founding of Egypt's first historical dynasty can be set close to 3100 B.C., or about 800 years before the Flood date according to Ussher's chronology. In other words, it now seems impossible to harmonize Ussher's chronology with Egyptian chronological data.

9

King lists and other chronologically useful records are also preserved for the various dynasties that flourished in Mesopotamia. Since they are less reliable than the Egyptian evidence for the earliest periods, however, they are not brought into this brief discussion.<sup>8</sup>

Once the chronology of ancient Egypt had been established, naturally it became useful to help date events and artifacts in neighboring countries with which Egypt had direct trade. Thus, for instance, by identifying Cretan pottery in a datable Egyptian context, as well as datable Egyptian material in Greece in association with Aegean finds, Egyptologist Sir Flinders Petrie managed to help date the Bronze Age of Greece.

Since the establishing of Egyptian chronology back to the third millennium B.C. has come the development of radiocarbon dating. With all its problems and assumptions (such as fixed and constant rate of decay), radiocarbon dates — especially when revised by tree-ring dates — have proved to be remarkably accurate and reliable. For the archaeologist, they have been of tremendous help in ordering past events. Much more could be said about new techniques that have been developed by the physical sciences, but I will leave that to others.

#### THE BIBLICAL GENEALOGIES

So far I have touched briefly on some of the evidence that calls into question Ussher's figure of 6,000 years for the age of man. And since that figure is dependent solely on an interpretation of the genealogies of Genesis 5 and 11, it is important to ask if that interpretation is justified. Were biblical genealogies ever constructed for chronological purposes? Can they now serve accurately as the basis for an absolute chronology?<sup>9</sup>

Even a superficial acquaintance with scriptural genealogies in general shows that they are frequently abbreviated by the omission of certain names. Thus it is clear that the genealogical purposes for which they were given obviously did not require a complete record of *every* generation, but only an adequate sampling of the particular line of descent.

This fact can be seen through the consideration of several examples. One of the best known is the genealogy of our Lord found in Matthew 1. Actually, two genealogies are presented there. The first is in verse 1: "Jesus Christ, the son of David, the son of Abraham." The second, in verses 2-17, expands the first genealogy into forty-two links divided for purposes of symmetry into three easily remembered sections of fourteen generations each. The divisions come at the two critical points of Israelite history: (*a*) the foundation of the Davidic monarchy and (*b*) the collapse of that monarchy.

TABLE 1

1. Abraham	15. Solomon	29. Shealtiel
2. Isaac	16. Rehoboam	30. Zerubbabel
3. Jacob	17. Abijah	31. Abiud
4. Judah	18. Asa	32. Eliakim
5. Perez	19. Jehoshaphat	33. Azor
6. Hezron	20. Joram	34. Zadok
	[Ahaziah, 2 Kings 8:25]	
	[Joash, 2 Kings 12:1]	
	[Amaziah, 2 Kings 14:1]	
7. Ram	21. Uzziah	35. Achim
8. Amminadab	22. Jotham	36. Eliud
9. Nahshon	23. Ahaz	37. Eleazar
10. Salmon	24. Hezekiah	38. Matthan
11. Boaz	25. Manasseh	39. Jacob
12. Obed	26. Amon	40. Joseph
13. Jesse	27. Josiah	41. Jesus <sup>10</sup>
	[Jehoiakim, 2 Kings 23:34; 1 Chronicles 3:16]	
14. David	28. Jeconiah	

The TABLE 1 listing shows at a glance that not even this second rendering of Christ's descent is complete when it is compared with the Old Testament (after Zerubbabel, there is no independent biblical listing). Between links 20 and 21, three generations are left out and Joram is said to have begotten Uzziah, his great-great-grandson. Not only are there *omissions* in Matthew 1, but also there are *additions* (such as the four women) having nothing to do with chronology.

From the listing of TABLE 2 it is apparent that the genealogy of Ezra has also been abridged by the omission of six consecutive names.

TABLE 2

1 CHRONICLES 6:3-14		EZRA 7:1-5		1 CHRONICLES 6:3-14		EZRA 7:1-5	
1. Aaron	Aaron			13. Azariah	----		
2. Eleazar	Eleazar			14. Johanan	----		
3. Phinehas	Phinehas			15. Azariah	Azariah		
4. Abishua	Abishua			16. Amariah	Amariah		
5. Bukki	Bukki			17. Ahitub	Ahitub		
6. Uzzi	Uzzi			18. Zadok	Zadok		
7. Zeremiah	Zeremiah			19. Shallum	Shallum		
8. Meraioth	Meraioth			20. Hilkiah	Hilkiah		
9. Amariah	----			21. Azariah	Azariah		
10. Ahitub	----			22. Seraiah	Seraiah		
11. Zadok	----			----	Ezra		
12. Ahimaaz	----						

## II

Another example, from 1 Chronicles 26:24, indicates that in the time of David "Shebuel the son of Gershom, son of Moses, was chief officer in charge of the treasuries." Since Moses died about 1400 B.C., obviously his grandson was not living in the reign of David 400 years later.

Or, take the genealogical data for Moses himself from Exodus 6:16-20, where his line is traced in four links back through Amram, Kohath, and Levi to Jacob. Evidence that some links are left out mounts when one compares such parallel genealogies as Joshua's, where 1 Chronicles 7:23-27 lists eleven generations for the same period. Corroborative evidence for missing links appears to come from Numbers 3:19, 27, 28, where it is stated that one year after the Exodus the males of the families of the four sons of Kohath (including Amram) numbered 8,600. If Kohath was indeed Moses' grandfather, his four sons had been unusually fertile!

Why do these omissions from the biblical genealogical lists occur? Whatever the reason, it is obvious that *not all* the links were needed to serve the biblical authors' purpose. Not only did they often abbreviate genealogies by omissions, but also they threw together persons of differing relationships under a common title descriptive of the majority, without a single word of explanation. Examples of this include 1 Chronicles 1:1-4, where there is a mixture of sons and brothers. If it were not for Genesis, one could conclude from this passage that Japheth was the son of Ham, and Ham the son of Shem.

Or, there is 1 Chronicles 1:36: "The sons of Eliphaz: Teman, Omar, Zephi, Gatam, Kenaz, Timna, and Amalek." Comparison with Genesis 36:11, 12, however, shows that only the first five were sons according to our usage of the term. Timna was a concubine of Eliphaz who bore him Amalek.

In the TABLE 3 lists of the genealogy of Kohath from 1 Chronicles 6, the first one includes as sons three who are actually brothers.

TABLE 3

1 CHRONICLES 6:22-24	1 CHRONICLES 6:37-38 (cf. EXODUS 6:24)
Kohath	Kohath
Amminadab	Izhar
Korah	Korah
Assir, Elkanah, Ebiasaph	Ebiasaph
Assir	Assir
Tahath, etc.	Tahath, etc.

12

Many other examples could be given. A final interesting one is found in Genesis 46:16-18, where the sons, grandsons, and great-grandsons of Zilpah are listed with the statement that "these she bore to Jacob"!

One must conclude, from these and other examples, that "to bear," "to beget," "father of," and "son of" are used in a wide sense in Scripture to indicate descent without restriction to the immediate offspring.

#### THE GENESIS 5 AND 11 GENEALOGIES

But what about the genealogies of Genesis 5 and 11? Do they not embrace *all* the links in the line of descent from Adam to Noah, and from Shem to Abraham, since (unlike the genealogies already considered) they regularly attach to each name in the list the age of the father at the birth of his son? This feature appears to provide a continuous series for which one would have only to add up the numbers to get an exact chronological span. As plausible as this approach seems at first, however, it would seem unjustified after consideration of the following points conveniently made by William Henry Green.<sup>11</sup>

#### *Analogy*

As we have already seen, the analogy of other biblical genealogies is decidedly against considering the Genesis genealogies as complete for chronological purposes. Where we have independent evidence to check other biblical genealogies, there is incontrovertible evidence of abridgment. Since these genealogies are obviously not designed to be strictly continuous, we would need some external evidence to suggest that Genesis 5 and 11 are exceptions to that rule. But as far as the Bible goes, not only are we left *without adequate data* for the period between Abel and the Flood, and the period between the Flood and Abraham, but we are left *without any data whatever* that can be compared with these genealogies for

the sake of testing their continuity and completeness. I propose, however, that we now have extrabiblical evidence (such as the archaeological data already mentioned) that *has* provided data (and continues to do so) which suggest there *are* missing links in the Genesis chain of descent from a chronological point of view.

### *Purpose*

It has been suggested by some (*a*) that the argument from analogy just proposed does not apply to Genesis 5 and 11 because their construction is unique and (*b*) that therefore their purpose might be different — maybe even chronological. But we have already seen that the fact that each member of the series is said to have begotten the next one is no evidence in and of itself that no links have been omitted. So what about the number given? Why does the author give each patriarch's age at the birth of his successor if not to give the necessary elements to compute the time from Creation to Abraham? Whatever the reason for the numbers, it cannot have been chronological — because, of all the numbers given with each patriarch, only an addition of the first can be made to yield a chronological result. Surely all the numbers are too closely bound together to be separated in their intention; a reason which would account for the insertion of all the numbers is the author's purpose of giving a conspectus of individual lives.

The numbers emphasize the patriarchs' mortality in spite of their longevity, which decreases markedly after the Flood. In order to demonstrate the original term of human life and how it gradually narrowed, the author did not need *every* individual in the line from Adam to Abraham. All he needed was a series of specimen lives with the appropriate numbers attached. If this hypothesis is correct, it would be a mistake to try to make the numbers serve a chronological purpose.

This conclusion is strengthened when we realize that the initial appearance of a possible chronological scheme in Genesis 5 and 11 is not intrinsic in the data themselves but is purely the effect of the sequential arrangement. And the insertion of the numbers does not change in the least the character of the Genesis genealogies, which must be subject to all the laws that governed the formation of other biblical genealogies, including free compression and the omission of links. The numbers are strictly parenthetical in nature, like the parenthetical insertions in the Matthew 1 genealogy.

Since these additions are parenthetical in nature, they should be read with sole reference to the names to which they are attached. They cannot determine whether or not links have been omitted. It is true (because the parenthetical information is numbers) that their arrangement one after the other produces the illusion of a chronological scheme. But this accident is due to the nature of the parenthetical information, and it must not blind us to the fact that they are nothing more than

ordinary genealogies to be interpreted on the same principles as other biblical genealogies are.<sup>12</sup>

Finally, if the purpose were chronological, the author kept it a secret. Nowhere does he add up the numbers or even suggest that his readers do it. And nowhere in the Bible does any other inspired writer deduce a chronological statement from these genealogies.

### *Different Numbers*

Another consideration is the fact that the texts of the Septuagint version (the earliest translation of the Hebrew Scriptures) and the Samaritan recension of the Pentateuch both vary systematically from the Hebrew Massoretic text in both the Genesis 5 and the Genesis 11 genealogies.

14

As shown in TABLE 4,<sup>13</sup> the ages of different patriarchs at the birth of their successors are quite irregular in the Hebrew text. But the Septuagint introduces something like a regular gradation. The table also shows that Luke 3:36, following the Septuagint, adds a patriarch who is completely absent from the Hebrew and Samaritan. This addition, and the alternate numbers, produce a difference of nearly 1,500 years between the Hebrew and the Greek for the interval between Adam and Abraham.

TABLE 4 (Genesis 5 and 11)

	HEBREW	SEPTUAGINT	SAMARITAN
Adam	130	230	130
Seth	105	205	105
Enosh	90	190	90
Kenan	70	170	70
Mahalalel	65	165	65
Jared	162	162	62
Enoch	65	165	65
Methuselah	187	167 or 187	67
Lamech	182	188	53
Noah	500	500	500
Shem	100	100	100
Arphaxad	35	135	135
Cainan (cf. Luke 3:36)		130	
Salah	30	130	130
Eber	34	134	134
Peleg	30	130	130
Reu	32	132	132
Serug	30	130	130
Nahor	29	179	79
Terah	70	70	70
Totals	1,946	3,412 or 3,432	2,247



Which text is superior? On text-critical grounds, it is possible that the Hebrew is the original, the others diverging according to a set principle — that of making the lives of the patriarchs more symmetrical. It is important to note that this principle is *not* to effect a change in the chronological period as a whole; so even the versions seem to have had no interest in chronology at this point.

### *Structure*

The structure of the Genesis 5 and 11 genealogies may also favor the position that they do not contain all the names in their respective lines of descent. Their regularity seems to indicate intentional arrangement. Each genealogy includes ten names, and each ends with a father having three sons. Just as the genealogy of Matthew 1 is arranged in three periods of fourteen generations each by dropping the requisite number of names, so it seems probable that the symmetry of these primitive genealogies is artificial rather than natural. In other words, that the definite number of names fitting into a regular scheme has been selected as sufficiently representing the periods to which they belong is much more likely than that all these striking numerical coincidences should have happened to occur in these successive instances.

15

### *Historical Problems*

If the genealogy in Genesis 11 were complete, Terah would have been a contemporary of *all nine* of the patriarchs that preceded him (including Noah), and Abraham would have been a contemporary of at least *seven* of the patriarchs preceding him (including Shem for a minimum of 150 years).<sup>14</sup> If Cainan is added on the authority of Luke 3:36, then the situation is complicated even further. But the whole impression of the Abraham narrative is that the days of the Flood belong to a geological event long past and that the actors in it had died ages before.

The preceding paragraphs summarize a few internal reasons why Genesis furnishes us with no data for a chronological computation (other than a minimum) before the life of Abraham.<sup>15</sup>

### ANCIENT NEAR EASTERN GENEALOGIES

But the literary genre of “genealogy” is not unique to the Bible. It may be useful to consider several Old World genealogies, many of which have been brought to light by archaeological research. A fairly recent discovery, for instance, is the genealogy of the Hammurapi Dynasty, a text found in the British Museum. This “shows conclusively that the Semitic tribes west of the Euphrates and of the Upper Euphrates region had evolved an elaborated genealogical tradition at an early age — probably not later than the turn of the Third Millennium B.C.”<sup>16</sup> Since such

texts furnish an ancient Near Eastern context for the biblical genealogies, it would be apropos to ascertain whether *they* were ever constructed for chronological purposes. An example related to the Hammurapi Dynasty just mentioned is the Assyrian King List, which utilizes the same tradition found in the former but employs it for a tendentious purpose: to legitimize and justify the claims of a certain king to the Assyrian throne,<sup>17</sup> not to establish any chronological point.

The Genesis genealogies correspond in structure to the Sumerian-Babylonian King List,<sup>18</sup> which enumerates first the kings who reigned until the Flood and then those who reigned after it. In one of these lists, the seventh king was even carried off to the gods, as was Enoch. Later on, the king list mentions Mes-kiag-Nanna, successor to Mes-Anne-pada. But from contemporary historical inscriptions of his own, we know that Mes-Anne-pada was succeeded by his son A-anne-pada; thus the Sumerian King List, though it records the number of years each king ruled, omits certain links of importance to chronologists.

In the ancient Near East it was a common practice to use "son of" in the sense of "descendant of."<sup>19</sup> A well-known example of this is found on Shalmaneser III's famous Black Obelisk, where Jehu is called the son of Omri, when in fact he was not even of the same dynasty, but merely a successor. An interesting Egyptian example comes from a brief text in which Pharaoh Tirhakah (ca. 670 B.C.) honors his "father" Sesostris III (ca. 1870 B.C.). Not only were these two kings separated by 1,200 years, but they were from entirely different dynasties. Even though one must be careful with modern parallels, a third example may be taken from the genealogical reckonings of the Arabs, which exhibit characteristics similar to those of their ancient Semitic predecessors. The late king of Saudi Arabia, Abdul Aziz, was called Ibn Sa'ud (or "son of Sa'ud"), though he was really the son of Abdur-Rahman. Sa'ud, whose name he bore, died in 1724. Thus, Arabs, too, mention only outstanding links in the chain of descent.

Although examples could be multiplied from the ancient world, perhaps these genealogies suffice to show that their purpose, too, has to do with *not* the reckoning of exact chronology *but rather* the establishment of descent from some particular ancestor — a purpose unaffected by the omission of names.

#### CONCLUSION

It must be stated, then, that our present knowledge of human civilization in the ancient Near East apparently goes back (at Jericho, for instance)<sup>20</sup> to the seventh millennium B.C. This information was not available to earlier generations of Bible students, and they assumed that the Genesis genealogies were unbroken chains. The evidence indicates, however, that this assumption may legitimately be called into question — especially since the Bible nowhere adds up its genealogical fig-

ures nor gives the impression that the lives of the men it names overlapped each other to any unusual extent.

If, instead, the practice was to select ten names from Creation to the Flood, and another ten from the Flood to the calling of Abraham, to serve as outstanding links rather than continuous links, it has genealogical custom both within and without the Bible to support it. Thus Seth, for example, would have produced at age 105 either Enosh himself or a forebear of Enosh (just as in Matthew 1:8, where Joram "begat" his great-great-grandson), and so on. This leaves the total period before Abraham, or from the second millennium B.C. on back, undetermined as far as exact biblical chronology goes.

One easily sees, then, how the purported conflict between the Bible and science on this point proves to be an illusion. The Bible does *not* assign a 6,000-year history to the span of human life on the earth. This is done only by a particular *interpretation* of the Genesis genealogies — an interpretation which we have seen does not rest on very solid ground. As far as the Bible is concerned, we may assign to the interval between Creation and Abraham any length of time that may otherwise appear reasonable. For the kind of data to pursue that task, however, we will have to turn to God's revelation through nature and history.<sup>21</sup>

17

#### NOTES AND REFERENCES

1/ This essay (an edited version of an oral presentation made to the Washington, D. C., chapter of the Association of Adventist Forums on April 13, 1974) is included here by request of the Editor of SPECTRUM. Its intent was not originality but the summary of some evidence and opinion that could lead to a constructive discussion on a topic that seems to be of ultimate concern to many within the Adventist church. Though specific credit is not always given (because the presentation was not originally intended for publication), I wish to recognize indebtedness to the following:

Colin Renfrew, The problem of dating, in *Before Civilization* (New York: Alfred A. Knopf 1973), chap. 2.

Benjamin B. Warfield, On the antiquity and the unity of the human race, *The Princeton Theological Review* 9-1:1-25 (January 1911).

William Henry Green, Primeval chronology, *Bibliotheca Sacra* 47:285-303 (April 1890). Now reprinted in:

W. C. Kaiser, Jr. (ed.), *Classical Evangelical Essays in Old Testament Interpretation* (Grand Rapids, Michigan: Baker Book House 1972), pp. 13-27.

2/ Sir Isaac Newton, *The Chronology of Ancient Kingdoms Amended* (Dublin 1928), p. 187.

3/ Quoted in Kaiser, *Classical Evangelical Essays*, p. 12.

4/ The section on dating is heavily dependent on Renfrew's summary of the problem mentioned in note 1.

5/ The evidence for this conclusion was conveniently summarized by Siegfried H. Horn, A revolution in the early chronology of Western Asia, *Ministry*, pp. 4-8 (June 1957); A revolution in the early chronology of Egypt, *Ministry*, pp. 29-33 (June 1959).

6/ This discussion of Egyptian chronology benefits from William Kelly Simpson, Reconstructing the past, in W. W. Hallo and W. K. Simpson, *The Ancient Near East: A History* (New York: Harcourt Brace Jovanovich, Inc., 1971), pp. 190-196.

7/ Lynn H. Wood, The Kahun Papyrus and the date of the Twelfth Dynasty, *Bulletin of the American Schools of Oriental Research* 99:4-9 (October 1945).

8/ Helpful for those interested in pursuing the subject in depth is *Chronologies in Old World Archaeology* (Robert W. Ehrich, ed.) (University of Chicago Press 1965).

9/ The evidence concerning the biblical genealogies is derived primarily from articles first published long ago by the two fundamentalists, War-

field and Green, referred to in note 1. Another useful and more modern discussion is:

J. Liver, The basic principles of the tribal genealogical lists, *The World History of the Jewish People* (B. Mazar, ed.) (New Brunswick: Rutgers University Press 1971), vol. 3, pp. 198-201.

10/ Despite the claim of Matthew 1:17 that there are fourteen generations in the third section of the list also, there are only thirteen unless Mary is counted. Perhaps one was dropped from the list through a copyist's mistake.

11/ Cf. note 1. Note especially pp. 294-303 in his original publication or pp. 21-27 in the reprint.

12/ For a detailed study of this question, cf. Marshall D. Johnson, *The Purpose of the Biblical Genealogies* (Cambridge University Press 1969).

13/ The figures are derived from Siegfried H. Horn, *Seventh-day Adventist Bible Dictionary* (Don F. Neufeld, ed.) (Washington, D. C.: Review and Herald Publishing Association 1960), p. 204.

14/ These conclusions are based on a chart in *The Seventh-day Adventist Bible Commentary* (Francis D. Nichol, ed.) (Washington, D. C.: Review and Herald Publishing Association 1953), vol. 1, p. 185.

15/ There are still fundamentalists, however, who would believe the opposite. Representative of them is C. G. Ozanne, *The First 7,000 Years: A Study in Bible Chronology* (New York: Exposition Press 1970).

16/ J. J. Finkelstein, The genealogy of the Hamurapi Dynasty, *Journal of Cuneiform Studies* 20-1:116 (1966).

17/ Finkelstein, pp. 112-113. The basic publication of the Assyrian King List (both the Khorsabad and Seventh-day Adventist Seminary texts) is by I. J. Gelb, Two Assyrian King Lists, *Journal of Near Eastern Studies* 13-4:209-230 (October 1954).

18/ For a handy discussion and translation, see *Ancient Near Eastern Texts Relating to the Old Testament*, 3rd edition, with supplement (James B. Pritchard, ed.) (Princeton University Press 1969), pp. 265-266.

For a more definitive treatment, see Thorkild Jacobsen, *The Sumerian King List* (Chicago: Oriental Institute 1939).

For its relationship to the Genesis genealogies, see Abraham Malamat, King Lists of the Old Babylonian Period and biblical genealogies, *Journal of the American Oriental Society* 88-1:163-173 (January-March 1968).

19/ Examples from this paragraph are mentioned in T. C. Mitchell, Genealogy, *New Bible Dictionary* (J. D. Douglas, ed.) (Grand Rapids, Michigan: W. B. Eerdmans Publishing Company 1962), p. 457.

20/ Kathleen M. Kenyon, *Digging Up Jericho* (London: Ernest Benn 1957), p. 74.

For a convenient summary of even earlier evidence of man, see Emmanuel Anati, *Palestine Before the Hebrews* (New York: Alfred A. Knopf 1963).

21/ As scientists and archaeologists debate the interpretation of their data, however, it seems clear that as yet they can make no definitive estimate of this time period either. Authoritative for Seventh-day Adventists, the Ellen G. White statements pertinent to this question will have to be discussed.

# The Fossil Forests of the Yellowstone Region

19

RICHARD M. RITLAND  
STEPHEN L. RITLAND

Remains of ancient trees are preserved in many parts of the world in varied formations — from the rocky bluffs protruding through the ice sheets of Antarctica to the barren lands of Spitsbergen far north of the Arctic circle. Nor are the occurrences restricted to any particular level. Large stumps of extinct types of trees are known in ancient, low-lying Devonian strata. By contrast, in Alaska's Valley of Ten Thousand Smokes, in Oregon's Lava Cast Forest, and in Hawaii's recent lava flows may be found the empty casts of intact wood of trees preserved in the last few centuries, some even within the lifetime of persons now living.

The Petrified Forest National Monument near Holbrook, Arizona, with abundant silicified logs preserved in rock strata of various tints and hues forming a "painted" desert, is certainly the most famous locality. This widespread formation extends far beyond the boundaries of the monument and into several states. Nearly all of the trees here are prostrate, and many give evidence of having been washed around or transported by water. Some seem to have been battered, others charred; still others are near tree-length and intact. The delicate structural features of the wood are seldom well-preserved, and leaf imprints are uncommon.

Of all known fossil forests in the world, however, none can equal those in the Gallatin Mountains of northwest Wyoming and southern Montana. Here are found a series of what have been interpreted as more than 40 forests — with stumps standing upright in the position of growth, frequently so well preserved that from a distance the fossil stumps may be difficult to distinguish from those of living trees (FIGURES 1-4). Although the size tends to vary from level to level,

stumps range from about an inch to more than 12 feet in diameter and from a few inches to over 20 feet in height.

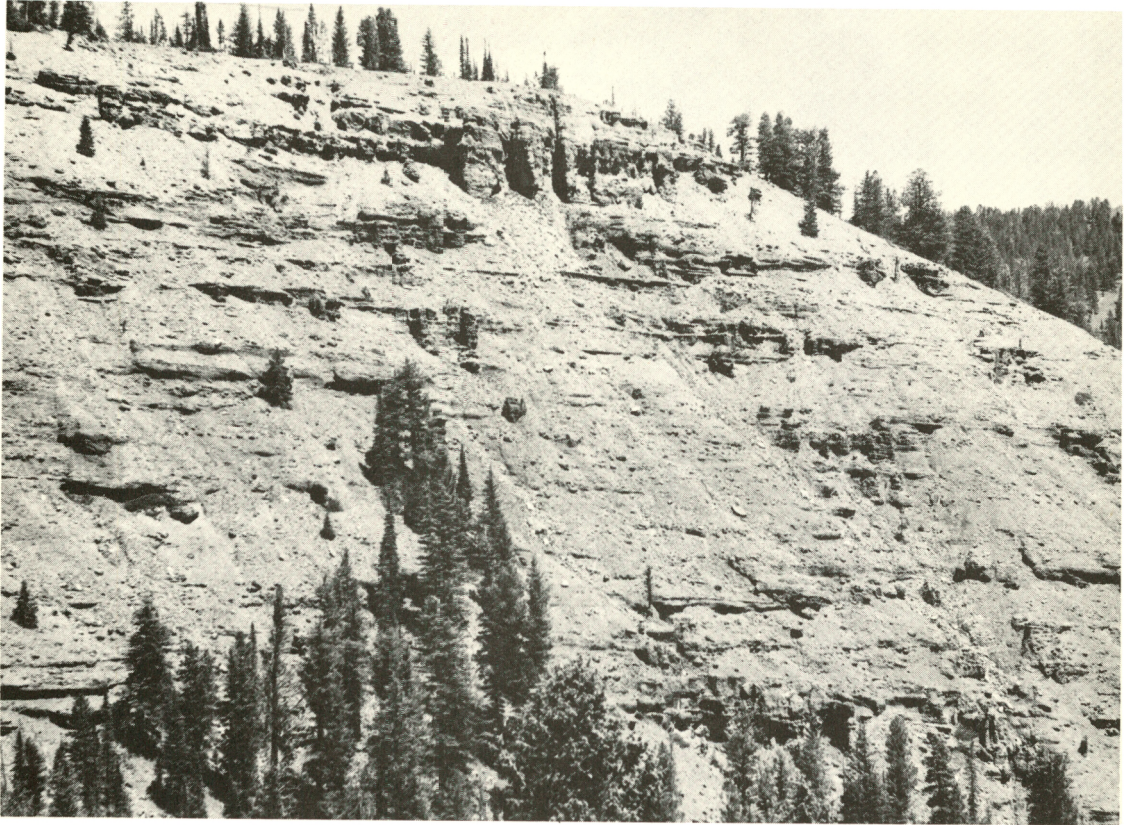
Associated with many of these forests are remains of ancient "soils"<sup>1</sup> with well-preserved leaves, needles, twigs, and occasional cones in the upper portions, and with organic detritus, roots, and rootlets as one proceeds down through the volcanic sediments on which the forests were growing (FIGURES 4-6). The quality of preservation of the wood and leaves is often superb. Well-defined growth-rings and intricate details of cell structure are visible in the wood, and the natural crinkly surface one encounters on dry leaves (with the patterns from the veins and venules) are visible on many of the leaf imprints (FIGURES 7-10, 18).

The fossil remains are not at just one level in the rock strata but at more than 40 successive levels, or zones, spaced through approximately 1,500 feet of volcanic strata (FIGURE 11). The evidence of the mechanism of growth, burial, and preservation (discussed in some detail later in the paper) seems in general to suggest: (a) the growth of a forest; (b) an episode of volcanism of the "explosive" variety, with resultant distribution of a layer of fragmental volcanic rock; (c) redistribution of volcanic materials and volcanic ejecta toward lowlands by wind, volcanic mudflows, and stream action, to cover the ground and surface-litter and to bury the lower portions of the tree trunks; (d) death of the trees — with decay of parts exposed above the ground, decay of many of the buried parts of those varieties of trees with wood of insufficient resistance to persist long enough for mineral infiltration, and beginning of petrification in the stump section of resistant types of trees and fallen logs covered by volcanic ejecta; (e) growth of another forest on the fragmental volcanic ejecta that destroyed the previous forest; (f) renewal of volcanic activity and partial burial of the second forest; (g) continuation of successive cycles of growth, burial, and partial preservation through a period of centuries — until many hundreds of feet of volcanic rock and more than 40 levels of forest have been buried. In this way, as a result of the renewed episodes of volcanic activity, a "layer-cake-like" buildup of volcanic deposits is formed, with remnants of forest preserved at many successive levels.

Subsequent to the period of intermittent volcanic activity and buildup of deposits, there is evidence of regional uplift of several thousand feet to form an elevated volcanic plateau. After the uplift, streams and rivers cut valleys in this plateau, dissecting the approximately level strata and leaving the edges of the rock layers exposed along the margins of the newly created valleys. On these exposed edges one can see the successive layers of volcanic ash and breccia (bresh'i-a) deposits, with enclosed zones of logs, leaves, and other plant materials.

FIGURE 1/ Ten-foot *Sequoia* on Ramshorn, at 10,000-feet. One of a series of stumps of approximately equal size on this level. *Opposite.*







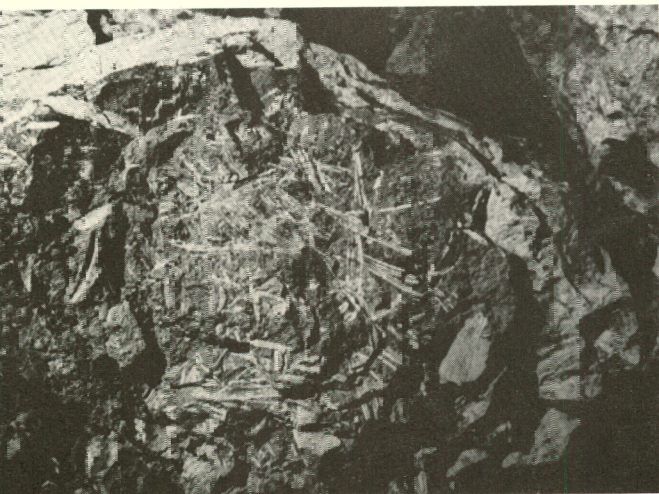
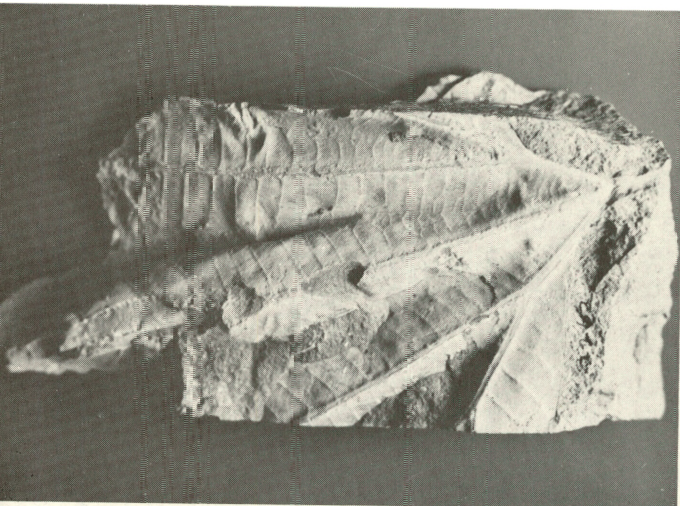


FIGURE 2/ Eastern end of Plot 1-B near Specimen Creek. Observe the approximate level surfaces (bedding planes) that have prevailed as the strata have been deposited. *Opposite, above...* FIGURE 3/ Closer view of Plot 1-B, showing stumps on several levels. *Opposite, below.*

FIGURE 4/ Stumps on level 11 of Plot 1-B, with roots extending into the level just below the organic zone. *Above...* FIGURE 5/ Needles on the upper surface of zone, level 11, Plot 1-B. *Below, left...* FIGURE 6/ Roots exposed below the organic zone, level 11, Plot 1-B. *Below, right.*



FIGURES 7-10/ Leafprints, with natural crinkly surface of dry leaves, indicating preservation in dry condition by volcanic ash. *Left to right.*

The transformation of high-level plateaus into mountainous regions by the forces of stream and river erosion is one of the major types of mountain-building represented in many of the mountainous regions of the world. In the Yellowstone region, the Gallatin and Absaroka Mountains, in which the fossil forests are preserved, are built of flat-lying dissected volcanic strata that were once continuous across the valleys before the valleys were cut into the plateau.

As it would require a period of many centuries for accumulation if these deposits represent the remains of a series of consecutive forests, the question is

sometimes raised whether the upright stumps are actually in position of growth or have been transported and deposited level upon level in a very short period of time. It is natural that conservative Christians would search for a solution to the seeming discrepancy between the record in the rocks, which is said to point to long time periods, and the scriptural account, which many believe portrays only a few thousand years since the Creation. The question has been brought into sharper focus in the last few years as the number of forest levels recorded has increased from the 12-18 known in the deposits of the northeast sector of Yellowstone Park for nearly a century to 44 or 45 levels as the deposits in the extreme northwest corner of the park have been studied and as the relation of the fossil forests to older and younger strata has been recognized.

Much of the discussion of possible transport models has been oral, and various suggestions have been or are being introduced. The most comprehensive statement of a preliminary model of which we are aware is by Coffin (1968:23-27). Since we have not been able to see how the field evidence can be satisfied by transport models thus far proposed, we do not have any version of such a model to suggest for evaluation or testing.

Perhaps it would be helpful, however, to list some of the features of a minimal model: (*a*) breaking loose from the ground of large numbers of stumps, the tops of which have been broken off (perhaps by high winds); (*b*) transport of some of these stumps, together with floating logs, leaves, etc., to the vicinity of the Absaroka Volcanic Field; (*c*) settling of scattered stumps and other tree remains on a volcanic substrate (the stumps are generally thought to have floated and settled in upright positions because of waterlogged basal ends); (*d*) burial by volcanic rocks from the many active volcanoes in the region (including air-dropped ash and breccia, volcanic mud or debris flows, and volcanic conglomerates or sandstones); (*e*) repetition of many cycles of flotation and burial in relatively rapid succession until thousands of feet of volcanic rocks with levels of stumps and other organic remains have been deposited.

In our exploration of the fossil forests, we have attempted to find a solution to the time problem and at the same time to discover truth. Since the nature and significance of the fossil forest deposits have been the subject of considerable discussion and interest in Adventist circles during the past ten to fifteen years, it seems timely to review several of the lines of evidence bearing on the questions of (*a*) whether a series of forests in position of growth is represented or (*b*) whether the fossil remains have been transported to their sites of deposition in a short time. Studies in progress by a number of investigators on these and other lines of data should provide additional information for understanding the sequence of fossil forest remains.

## STUDIES ON THE FOSSIL FORESTS

26

The petrified forests of Yellowstone National Park were first described and interpreted by Holmes in 1878 as a series of superimposed forests, and it is his cross-sectional diagram of the "fossil forest" that has been reproduced in countless geology textbooks (FIGURE 11). The most comprehensive description and discussion of the fossil forests and associated leaf fossils is the monumental study by Knowlton published as part of Monograph 32 of the United States Geological Survey (1899:651-791). More recently, Dorf, of Princeton, and his students have made a rather thorough restudy of the deposits exposed in the northeast section of Yellowstone, including the stratigraphy, volcanic breccias, and revision of the flora. Thus far, however, only a preliminary report of the revision of the flora and several theses and nontechnical articles on the fossil forests have been published (Brown 1957; Dorf 1960:164). The recent thorough field study on the stratigraphic framework of the Absaroka Volcanic Field by Smedes and Prostka of the U. S. Geological Survey (1972) is an excellent resource on the origin, geological relations, distribution, and stratigraphy of the beds in which the forests are preserved. A number of lesser studies and popular descriptions are listed in the literature cited at the end of this paper (see Weed 1892; Hague 1896; Read 1933; Chapman and Chapman 1935; Andrews 1939; Andrews and Lenz 1946; Sanborn 1951; Beyer 1954; Hall 1961).

Of particular interest to students of science and religion are some of the references to the forests in various apologetic works. Whitcomb and Morris (1961: 418-421) interpret the fossil forests as catastrophically destroyed, uprooted, transported by water to the site of deposition, and there interbedded with volcanic ejecta. It is doubtful, however, that these writers had seen the area in the field or had read the basic studies by Knowlton and others, because several statements made do not agree with facts that have been understood since the time of discovery and early description of the phenomena. For example: "Only occasional trees remain upright;" there are "no limbs or fossil foliage as one would expect if the complete trees had suddenly been inundated."

Cook (1966:273-275), an industrial chemist, suggests a variety of possible solutions, including the idea that the forest levels have resulted from a series of fractures in which the several levels have been slid or thrust one over another. None of the proposals are evaluated on the basis of the field data or the technical literature. No evidence is presented to indicate widespread low-angle faulting between forest levels — which would be conspicuous if faulting had occurred.

Of a very different nature is the much more thorough and carefully worked out proposal introduced by Coffin (1968). In the summer of 1968 he, Donald W. Jones, and two assistants spent six weeks studying the fossil forests of the Speci-

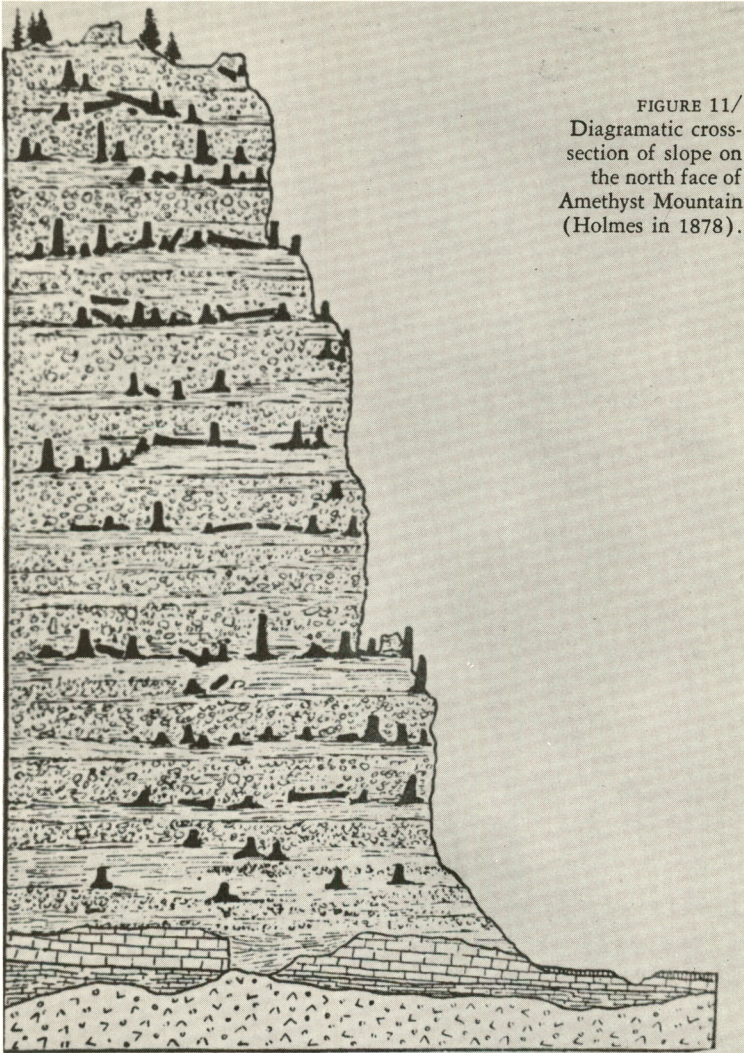


FIGURE 11/  
Diagrammatic cross-  
section of slope on  
the north face of  
Amethyst Mountain  
(Holmes in 1878).

men Creek area in the Gallatin Mountains. Using data and plots from our studies in the same area the previous field season, they made additional detailed plots and observations, particularly in the area we had designated Plot 1-B. The results of their observations are summarized in two mimeographed papers (1968) that have been rather widely distributed to science teachers and other associates. Coffin presents an impressive array of points that he deems are not compatible with the interpretation that the fossil forests are in position of growth. He then introduces a tentative transport hypothesis similar in certain respects to the hypothesis he has published as an explanation for the upright stump horizons in the Carboniferous strata exposed in the sea cliffs near Joggins on the Bay of Fundy at Nova Scotia (Coffin 1969). Since 1968, Coffin and several students and associates have spent





southern part of the Gallatin exposures, within 2 miles of Specimen Creek, the quality of preservation of not only the stumps and logs but also the leaf and detrital zones associated with them is superior to any we have encountered elsewhere in the volcanic field. The greatest concentration of large petrified stumps, many of them 8-12 feet in diameter, may be found exposed on several of the upper levels near the top of Ramshorn Mountain approximately 10 miles north of Specimen Creek (FIGURES 1, 12, 13, 38, 39).

In the 1967 field season, three fossil forest exposures north of Specimen Creek, within 3 miles of U. S. Highway 191, were selected for detailed study (FIGURE 14). Plots were constructed on a photographic base map. Petrified stumps, logs, and root and leaf zones were recorded and detailed data of a broad range were gathered for 44 stump horizons, or forest levels (FIGURES 15-23). This number of levels exceeds by 12 the highest number previously reported.<sup>2</sup>

FIGURE 13/ Counting rings on a large stump north of Ramshorn.

## THE GEOLOGIC SETTING

We acknowledge our indebtedness and express our appreciation to Edward N. and Marilyn P. Lugenbeal, Juanita and Stanley Ritland, Brenda Butka, Larry Mitchell, and other students and associates who have worked with us in gathering and interpreting data from these plots and from numerous other fossil forest exposures in the Absaroka Volcanic Field. Field study within the boundaries of Yellowstone National Park was made possible through the interest and cooperation of the National Park Service. Portions of the results of the 1967 field season are included in masters theses submitted to Andrews University by Marilyn Lugenbeal and Juanita Ritland (May 1968).

30

The fossil forests of the Gallatin Mountains are not a local or isolated series but part of a much wider picture, with other similar spectacular occurrence on the flanks of the Beartooths to the east, at many localities in the Absaroka Range to the south and east, and in Owl Creek Mountains far to the southeast (FIGURE 24, Map 1). These all occur in what seems to have been originally a continuous and considerably more extensive volcanic field, the dissected remnants of which still cover some 9,000 square miles and embrace approximately 7,000 cubic miles of deposits.<sup>3</sup>

The volcanic sequence has been named the Absaroka Volcanic Field because the Absaroka Range represents the heart of the field and its most extensive component. The proper technical designation for the volcanic series, given by Smedes and Prostka (1972), is *Absaroka Volcanic Supergroup*. Most of the exposures are within an area of approximately 70 by 170 miles in a northwest-southeast trending direction from the vicinity of the Stratified Wilderness area north of Dubois, Wyoming, continuing northwest through the eastern and northeastern portions of Yellowstone National Park, and extending well beyond to the mountains just south of Bozeman, Montana. Many of the best-known fossil deposits are in or near the park; hence the fossil remains are often referred to as the fossil forests of Yellowstone.

It is important to recognize that the fossil forests represent only part of a much larger picture. Although it is not possible in a short paper to give an adequate treatment of the geologic setting, a few glimpses may give some idea of the complex and fascinating story. Lying beneath the volcanic strata is a sequence of more than a score of sedimentary rock formations,<sup>4</sup> some with land life (such as mammals, dinosaurs, plants, coal beds, land snails, or freshwater mollusks) and other formations with various forms of sea life (FIGURE 25). Each of these rock formations is a characteristic assemblage that differs from the remains in the beds above and below. Some contain rounded boulders eroded out of fossil-bearing rock and redeposited in a later rock formation. Land and sea deposits may alternate; or several deposits of one may be followed by one or more of the other.

Nor are the fossil forest volcanic strata the final chapters in the story. Above



these strata, locally, are other volcanic rocks called welded tuff. After the volcanic activity there has been very extensive stream erosion and glaciation, as is amply demonstrated by the deep valleys, steep mountain faces, glacial lakes, and other features carved into the Absaroka Volcanic Field, originally an area of low relief (FIGURE 26). In some of the newly formed valleys carved into the Absaroka volcanics by erosion are found the stratified remains of ancient Indians, together with typical assemblages of artifacts. Typical sites are found beneath overhanging cliff faces, where natural shelters have been formed by the forces of erosion. One of the better-known sites is Mummy Cave, located on the North Fork of the Shoshone River west of Cody, Wyoming. The fact that the floor of Mummy Cave is only a few feet above the present water level of the river demonstrates that the evidence for ancient Indians at Mummy Cave postdates almost all of the erosion that has occurred in the Absaroka Volcanic Field. Nevertheless, Mummy Cave is said to contain some 38 distinct cultural levels. Radiocarbon dates from 7280 B.C. to A.D. 1580 are reported from 15 of the levels (Wedel et al. 1968:184-186) (FIGURE 27).

It has been possible to present samples of only a few of the salient facts in the general picture. Because of the limitations of space, more is omitted than is in-

FIGURE 14/ Exposures north of Specimen Creek, with 44 levels of petrified stumps plotted (Plots 1-A above in upper left and 1-B below; Plot 2 in lower right).



cluded. Any valid model of the geologic history of the Yellowstone region must include both time and mechanisms for the following phenomena: (a) accumulation of more than a score of older sedimentary marine and land strata having an aggregate thickness of thousands of feet, with erosional gaps at certain levels, and with diverse but distinctive fossil assemblages; (b) uplift, erosion, and truncation of many strata before the deposition of the Absaroka volcanics; (c) deposition of up to 5,000 feet of volcanic deposits during a series of volcanic episodes punctuated by more than 40 intervals, each with sufficient time for the growth of a forest; (d) extensive dissection of the volcanic field by stream and glacial erosion, exposing on the canyon walls the forest-bearing strata; (e) accumulation of many levels of ancient Indian occupation and artifacts in the posterosion valleys near the present-erosion level.

32

The rocks in which the fossil forests are preserved are derived from material ejected during terrific volcanic explosions. During such explosions, rock fragments ranging from dust-sized particles to boulders many feet in diameter are thrown hundreds to thousands of feet into the air and dropped in chaotic assemblages around the vents from which the rocks have been extruded. The finer the particles, the further they are transported from the vent. The Katmai eruption in

FIGURE 15/ Three-foot conifer (pine type) on level 43 of Plot 1-A.



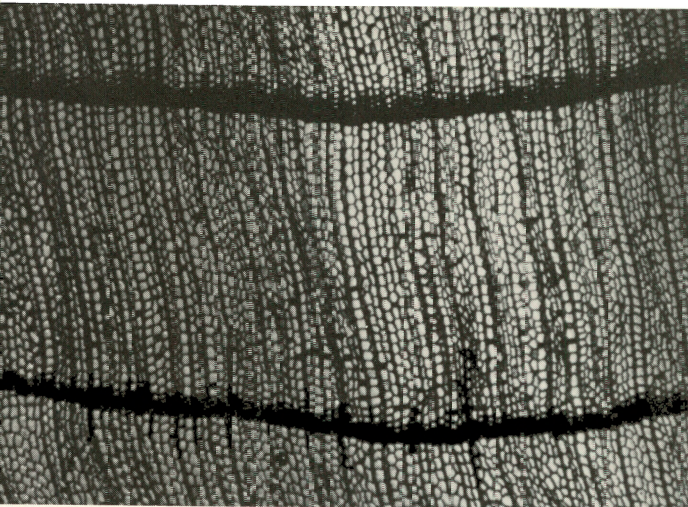
1912 provides a recent example on a small scale (FIGURES 28-31). A blanket of fine volcanic rock fragments approximately a foot thick was spread over much of the eastern part of Kodiak Island approximately 100 miles from its source-vent in the Katmai area on the mainland. A 55-inch layer of airborne volcanic fragments was deposited at the head of Amalik Bay 15 miles from the volcano. Takli Islands, 21 miles southeast of the volcano, were covered with 3 feet of volcanic detritus (Martin 1913:167-170).

Because of the fragmental and often angular character of the rock, such ejecta are described by the term *pyroclastic* (fire fragments) or *volcaniclastic* (volcanic fragments).<sup>5</sup> These rocks should not be confused with the more familiar type of volcanic eruption where molten rock flows from volcanic vents, or fissures, and cools to form dense crystalline lava rock. *Breccia* is a general term for any rock whose components are angular rather than waterworn or rounded. When the volcanic fragments are mostly fine angular material less than 2-4 millimeters in diameter, they may be referred to as *ash* if loose or *tuff* if cemented to form a solid rock. If coarser angular pieces 2-4 millimeters or more in diameter predominate, the resultant rock is a true *volcanic breccia*. A *volcanic conglomerate* may result when the deposits are reworked by running water and become smoothed

33

FIGURE 16/ Twelve-foot *Sequoia* on slope south of Plot 1-A (level 29).





and rounded. Deposits that have resulted from rapid mass-flowage of rock debris that originates on the slopes of a volcano are referred to by the Indonesian term *lahar*. Such material is lubricated by water and, depending on the texture, may be referred to as a *debris-flow* or a *mudflow*.

The rocks of the Absaroka Volcanic Field are the result of many episodes of volcanic activity from shield volcanoes scattered throughout 10,000 square miles. As a single period of volcanic activity may result in a range of deposits, the concept of a volcanogenic unit (i.e., those deposits resulting from a single episode of volcanic activity) may be very helpful in the study and description of these deposits (Smedes and Prostka 1972; Parsons 1967).

On the flanks of the volcanoes near the vents and forming the upper portion of the volcanic cone is found a chaotic assemblage of coarse breccias, lava flows, lahars, pumice deposits, and tuffs sloping away from the vent at angles of 30 degrees or more (FIGURE 32). Referred to as the vent facies, these rocks may be interrupted by dikes, plugs, and other extrusive features. The rock fragments in the breccias are relatively angular and are unsorted; they range from less than an inch to several feet in diameter. Progressing away from the volcanoes, the primary slope is reduced to less than 5 degrees. Grading out from the volcanic centers for 10-20 miles, the beds tend to decrease in average size and thickness; the proportion of volcanic conglomerate and sandstone deposits (reworked, more or less rounded, partially sorted, and stratified by stream action) tends to increase. The apron of partially reworked volcanic deposits is referred to as the *alluvial facies*. In this apron there are still many zones of air-dropped volcanic ash and fine breccia (Smedes and Prostka 1972:64; Smedes 1957 personal communication). Tongues of relatively unsorted lahar deposits may include boulders from small size to more than 25 feet in diameter.

FIGURE 17/ Photomicrograph of rings of 12-foot *Sequoia* displaying rows of tracheids in the xylem. *Left*. . . FIGURE 18/ Fossil *Sequoia* needles. *Right*.

Features of the rock fragments, as well as the beds themselves, are helpful in determining the origin. Dikes and pipes of breccia intruded in and near the volcanic vents indicate that brecciation, or fragmentation, occurred in the volcano; the volume of the deposit suggests whether the extrusion was composed of large volumes of material broken up underground or just material from the walls of the vents and fissures during eruption. Other matrices indicate that some of the flows had magmatic matrix (Parsons 1967). Abundant zones of airfall tuff and fine breccia retain many of the sharp edges on the volcanic glass fragments, whereas those reworked by water show signs of wear on these edges.

35

After an initial period of volcanic activity, the ejecta often becomes saturated with water from the heavy rains that frequently accompany the activity. Thus saturated, the material may take on the consistency of soft mud or concrete and may flow out for miles into the lowlands, as tongues projecting from the volcanoes. In recent times such lahars have spread out in lowlands, transporting large and small boulders, surrounding trees, and covering large areas of land some miles away from the volcanic vents. They may come to rest as beds with slopes as low as .5 percent (Crandell and Waldron 1956:349-362). Lahars are common features both in the vent and the alluvial facies of the Absaroka Volcanic Field.

FIGURE 19/ Organic zone below 12-foot *Sequoia*. Numerous leaves are preserved on the upper surface. One can be seen to the right of the center. Observe that the tuff is more highly indurated (cemented) in the organic zone.



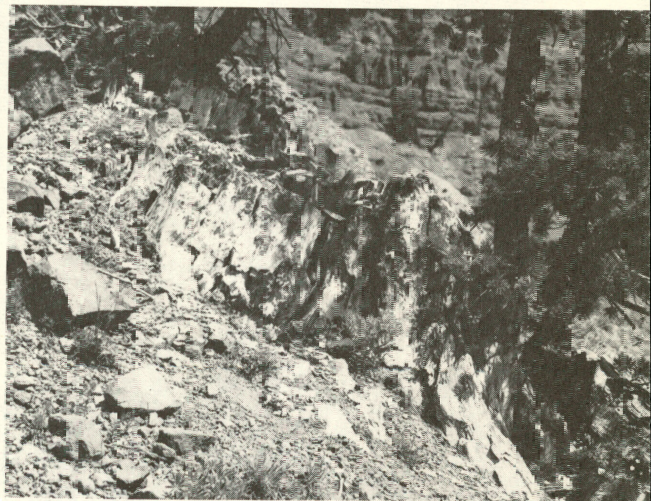
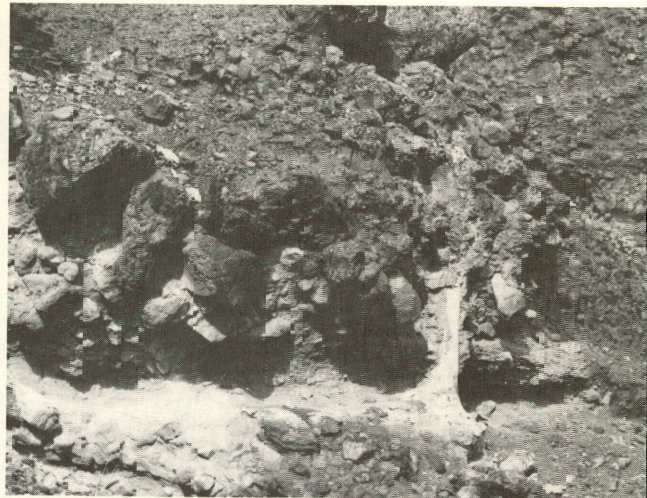
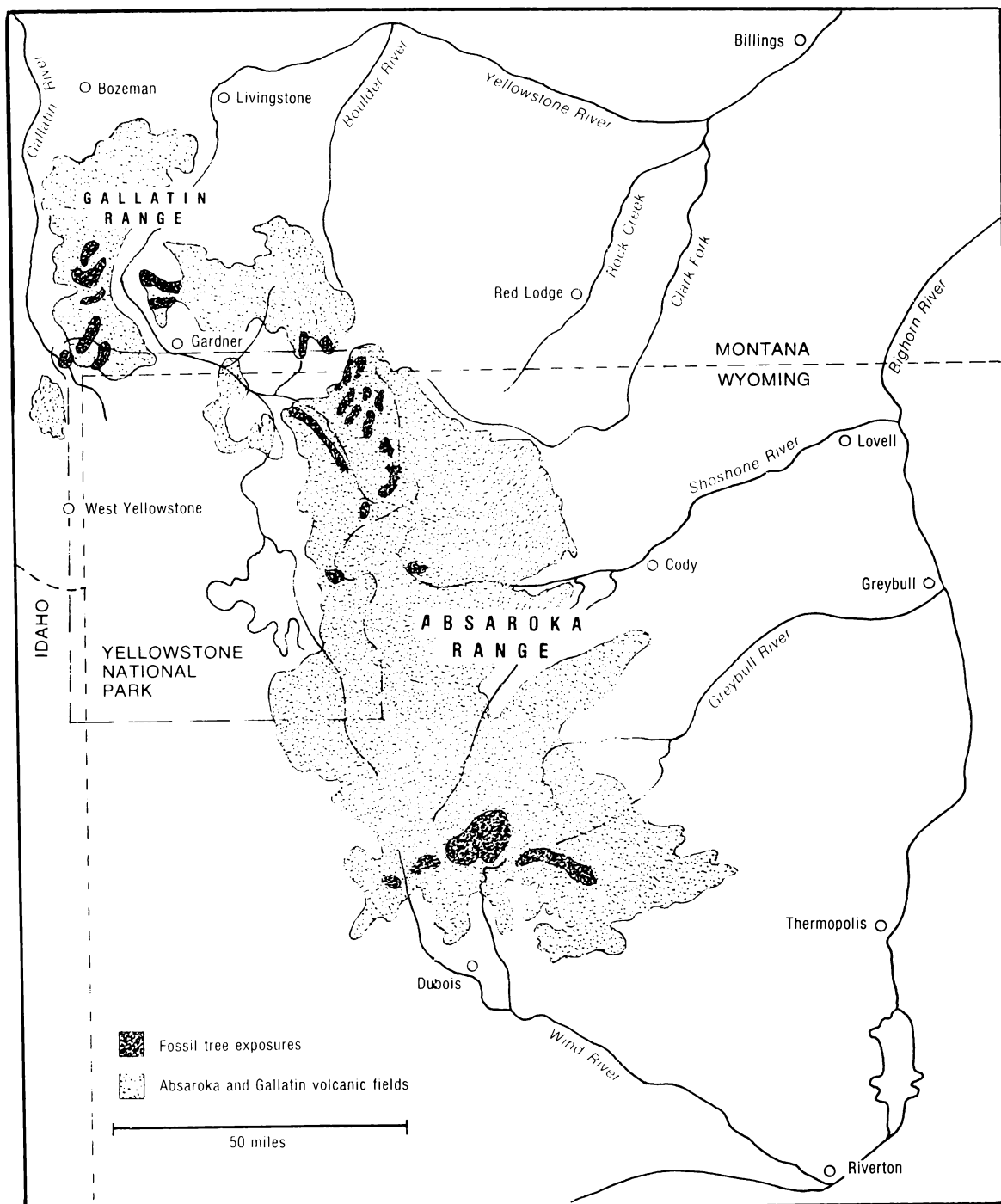


FIGURE 20/ Five-inch conifer of pine type. One of many small trees on level 18 of Plot 1-B. None of the upright stumps on this level exceeded 6 inches in diameter. Above, . . . FIGURE 21/ Distant view of the same tree as in FIGURE 20. Note numerous boulders, from a few inches to 3 feet across. Probably a Lahar (volcanic mudflow) is represented. Top, right, . . . FIGURE 22/ Eight-foot *Sequoia* on level 37, Plot 1-A. Center, right, . . . FIGURE 23/ Seven-foot *Sequoia* on level 36, Plot 1-A. Bottom, right, . . . FIGURE 24/ Map of major fossil forest outcrops in Absaroka Volcanic Field (Map 1). Opposite.

It is in the volcanic conglomerates, lahar deposits, breccias, and tuffs of the alluvial facies surrounding the volcanoes that logs and upright stumps are most abundantly preserved (FIGURE 32). Well-preserved fossil leaves may be found in fine-grained zones of air-dropped ash in both the vent and the alluvial facies and in fine-grained sediments of the alluvial facies. They are rarely found in coarse alluvial facies deposits from which most of the fine-grained deposits have been reworked basinward (Smedes and Prostka 1972:67).



LINES OF EVIDENCE  
BEARING ON POSITION OF GROWTH OR TRANSPORT

ORIENTATION

The most striking and compelling feature of the fossil forests is the orientation and spacing of the trees, the vast majority being in either upright or approximately prostrate position, much as in a contemporary forest. Standing erect on the slopes, bleached by the sun or discolored by a growth of lichens, the petrified trees are likely to be mistaken for the stumps of recently living trees. With rare exceptions — such as two trees growing very close together but naturally diverging (see FIGURE 33) — the stumps are perfectly vertical. Sometimes a uniform slight tilt of 4 or 5 degrees, resulting from postdepositional warp of the strata associated with regional uplift or depression, consistently affects the strata and all stumps.

38

Floating stumps rarely come to rest in a perfectly vertical position, although occasionally the heavier waterlogged basal end of a tree may cause it to float in an approximately upright position because of the movement of water currents and the irregularity of root growth. But it hardly seems likely that thousands of stumps on more than a score of levels over hundreds of square miles will consistently assume and maintain a perfectly vertical position while being drifted by currents and subsequently buried by tens of feet of fine to coarse rock material. The volcanic rocks commonly include pebbles from gravel-size to boulder-size, as much as 2-4 feet in diameter at some levels. To transport such boulders requires swiftly flowing water or suspension in high-density volcanic mud that may move slowly or rapidly. Such forces would be expected to tilt or overturn even short, massive stumps. Slender stumps up to 20 or more feet tall and only a few inches to 2 or 3 feet in diameter could not possibly remain erect before such an onslaught unless they were firmly rooted (FIGURES 35-37; also 20, 21).

Nor is it feasible, for several reasons, to conclude that upright stumps would be transported in lahars (mud- or debris-flows) for significant distances. First, there is no conceivable source for large numbers of stumps on the shield volcanoes from which the lahars arise (FIGURE 32). Second, although occasionally a waterlogged tree may be of approximately the same density as water (so that it can assume an upright position in sluggish waters), lahars have a density approximately twice that of water. This would tend to force even waterlogged stumps toward the surface, where they would fall to a prostrate position on the flow (FIGURES 20, 21, 35). Moreover, in the strata encompassing the stumps (air-drop tuff, lahars, and water-deposited volcanic sediments and conglomerates), individual beds are rarely deep enough to support stumps of even modest height in an upright position.



NATURAL SPACING

It is well known that tree-remains transported by rivers or floods are often deposited in a chaotic condition such as one encounters in logjams or tangled masses of driftwood. Such remains have been reported in a number of fossil beds, including in certain lignite or brown-coal deposits that seem to have been formed from log-rafts (Wieand 1935:38, 39, 46; Lyell 1853:267).

An impressive feature of the Yellowstone forests, by contrast, is the apparently natural distribution or spacing of the petrified stumps such as one observes between living trees (FIGURES 38, 39). To compare the tree density in the fossil forests with that of living stands, we calculated the tree density on several levels on which the fossil trees were most common (levels 21 through 24 of a plot above Specimen Creek).<sup>6</sup> In doing so, we assumed that all the trees in a 15-foot-deep section of the slope were exposed. The figures arrived at were:

39

Level 21	71 trees per acre	Level 23	132 trees per acre
Level 22	133 trees per acre	Level 24	41 trees per acre

These compare favorably with yields of some present-day stands. Examples of trees per acre (Forestry Handbook) for fully stocked stands are:

TREES PER ACRE (by age of stands)				
AGE OF STAND	25 YEARS	50 YEARS	100 YEARS	200 YEARS
Eastern Cottonwood (Mississippi Valley)	114	32	—	—
Loblolly Pine	630	325	—	—
Yellow Poplar (medium site)	264	214	—	—
Western Hemlock (medium site)	—	—	212	90

Juanita Ritland (1968:31-33; appendix B, 1-b to 4-b) reports comparable spacing and densities on certain levels in the Specimen Creek and Lamar Valley areas to densities observed in a transect through a living forest. In comparing the densities, one must take into account several factors. It is likely that stands of trees on relatively fresh volcanic deposits would not be as dense as on mature soils. Moreover, not all trees are equally likely to be preserved. Some trees decay before they are preserved, whereas others do not petrify to a state sufficiently harder than the surrounding rock to make them stand out above the loose rock that covers portions of the slope. Hence, more often than not, a significant portion of the trees that would have been growing at the time when the forest was destroyed would be missing.

#### PREVALENCE OF ONE SIZE CLASS ON EACH LEVEL

An explorer of the fossil forests can hardly fail to be impressed by the changing scenes from level to level. If one starts near the crest of Ramshorn with the magnificent 10-foot *Sequoia* (called King of the Forest) and continues along the side of the mountain on this same level, a whole series of naturally spaced giant sequoias of similar size are encountered, as if one were in an old-growth forest along the California coast (FIGURES 38, 39). By contrast, levels 11 and 12 (on the slope we have designated Plot 1-B north of Specimen Creek) are composed of what woodsmen often refer to as second-growth forests, most of the upright trees ranging from 10 to 18 inches in diameter. On level 18, nearly all of the upright stumps are saplings of no more than 5 inches (FIGURES 20, 21). Other levels average 30, 48, and 72 inches, etc. Although the size may vary from 1 inch to 12 feet or more on the same level, as in most present-day naturally occurring forests, the prevalence of a given size class tends to be the rule.

40

#### CHARACTER OF LEAF PRESERVATION

It is often possible to infer much about the events of burial and preservation by the nature of leaf remains. Leaves accumulating under water or in pools and becoming limp are commonly as flattened out as a sheet. Those transported in a mudflow may be rolled or curled. Those entombed by windblown sediments or volcanic ash may retain the natural surface irregularities observed in dry leaves on the floor of a living forest (FIGURES 7-10). Ordinarily a fine matrix is required to preserve leafprints.

Leaves preserved in the volcanic ash beds (tuff) of the fossil forests commonly show the natural surface irregularities. If these leaves had been transported in water for many miles, or even accumulated beneath a body of water, most of them would exhibit the somewhat flattened pattern.

Often the most delicate features in the leaf imprints, including fine veins and margin patterns, are well-preserved in an angular volcanic ash matrix. If extended transport in a mudflow had occurred, such fine features would have been obliterated by the sharp edges of the rock particles.

#### DIFFERENTIAL DECAY AND PRESERVATION

It is a well-known fact of nature that "dust returns to dust," that even those parts of organisms most resistant to decay ordinarily are decomposed beyond recognition within a few months or years, to be recycled as minerals or nutrients into succeeding generations of life. Some types of wood are reduced to mounds of humus on a moist forest floor in less than a decade. By contrast, stumps of a few types (such as redwood or cedar, with fungicidal properties in the wood)



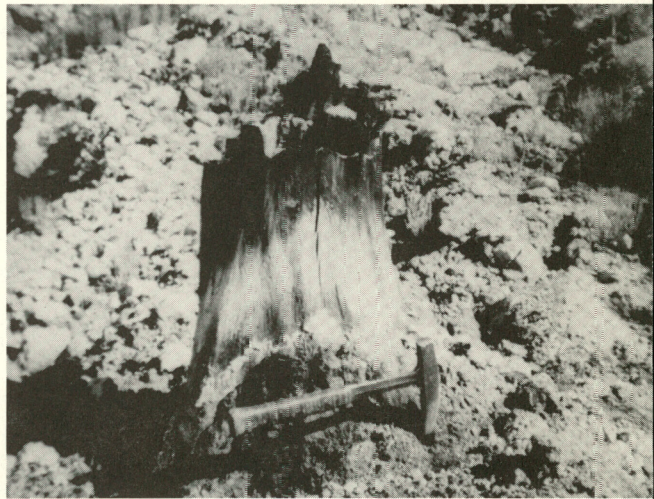
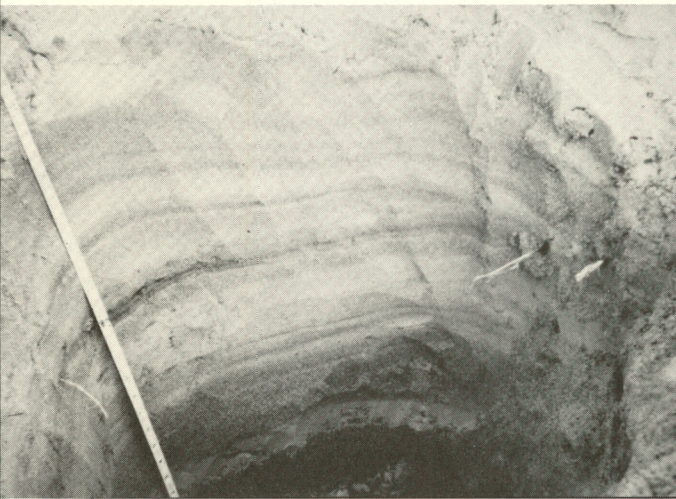
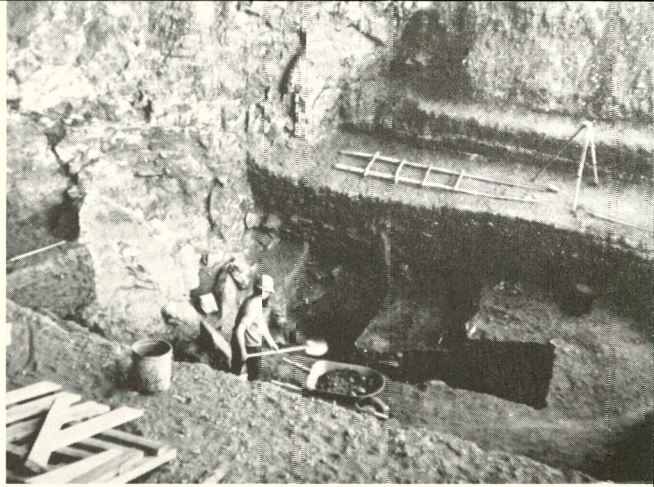


FIGURE 26/ Glacially grooved boulder above the Lamar Valley fossil forests. *Top, left.* . . . FIGURE 27/ Excavation of Mummy Cave west of Cody, Wyoming. Prostrate fossil logs are preserved in the ceiling of the cave, and uprights are found not far distant. The floor of the cave is close to the level of the present erosion, or water level, of the Shoshone River nearby. *Top, right.* . . . FIGURE 28/ Volcanic ash deposit from Kat-

mai eruption of 1912. Near lower end of the Valley of Ten Thousand Smokes. *Center, left.* . . . FIGURE 29/ Ash from the level immediately above the humus, with spruce needles and twigs preserved. *Center, right.* . . . FIGURE 30/ Hot-ash flow in the Valley of Ten Thousand Smokes. *Bottom, left.* . . . FIGURE 31/ Small stump preserved by hot-ash flow. Note charred upper end. *Bottom, right.*

## *Prevalence of Conifer Wood*

In the known fossil-plant deposits of the world, such as the vast coal deposits of the Cretaceous and Tertiary strata, wood of conifers is nearly always much better represented than wood of broadleaved trees; and leaves, pollen, and spores are still better preserved. Among the conifers, the wood of types that are slow to decay (such as *Sequoia*) are most likely to be petrified by infiltration with minerals from ground water. This is also true in the Yellowstone fossil forests.

To get the most complete picture of any fossil flora, it is necessary to study all types of fossils, including pollen, spores, leaves, and wood. Some species may be preserved in several ways, others in only one. Many other plants leave no identifiable trace of any kind.

The leafprints of nearly a hundred kinds of trees, shrubs, and ferns<sup>8</sup> are preserved in the sterile volcanic ash zones in Yellowstone. These include a variety of warm-temperate to subtropical broadleaved and coniferous species. On the basis of relative abundance of fossil leaves in the northeastern part of the park, Dorf (1960:257) concludes that sycamores, walnuts, magnolias, chestnuts, oaks, redwoods, maples, and dogwoods are the dominant species, with significant numbers of figs, laurels, bays, pines, and other types. The better indurated tuff (ash) zones yield a similarly varied assemblage of fossil pollen and spores (Fisk and DeBord 1974:442). This is similar to the composition of numerous other Eocene fossil floras in western North America.

As one might expect, however, petrified stumps and logs of conifers are more common than broadleaved tree stumps — undoubtedly reflecting the bias introduced by differential decay and preservation. Sycamore, the commonest leaf-fossil in Dorf's collections, is only occasionally encountered in wood samples. Lugenbeal (1968 appendix A) and Ritland (1968:35-36 appendix A) found conifer stumps nearly six times as abundant in the Specimen Creek area as broadleaved

43

FIGURE 32/ Hypothetical cross-section of vent and alluvial deposits from two volcanoes in the Absaroka Volcanic Field (after Smedes and Prostka).

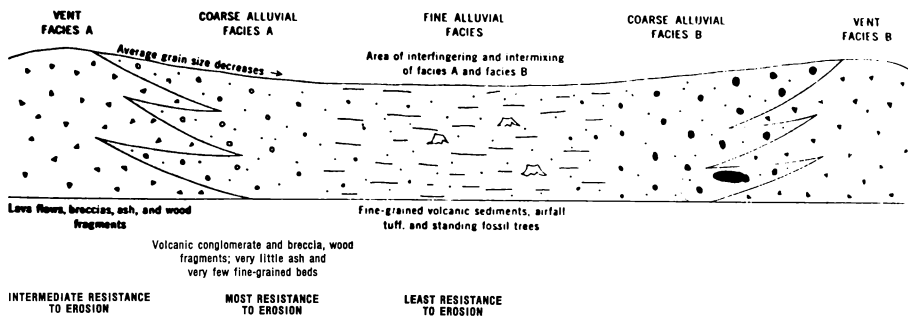




FIGURE 33/ Diverging petrified *Sequoia* stumps on Famborn not far from the tree shown in FIGURE 1. Trees that root close together diverge to separate their branches. A natural divergence seems to fit better with growth-in-position than with transport hypothesis. *Left*. . . . FIGURE 34/ Exactly the same phenomenon (as in FIGURE 33) exhibited by cedar stumps from a logged-over area in northwestern Washington. *Right*.

tree stumps. Of approximately 400 identified, 17 percent were broadleaved types. Among those of small diameter, however, the ratio increased to 36 percent. More than three-fourths over 30 inches in diameter were *Sequoia* or similar to *Sequoia*.

Many broadleaved tree species with nonresistant wood might be expected to decay before the volcanic ejecta would be sufficiently consolidated to form a cast and before mineral infiltration of the wood could take place. In such instances no remains of a stump could be detected. Sometimes there was sufficient consolidation of the strata so that a cast was preserved. Such casts may be filled with opal, amethyst, or pure white quartz, without a trace of wood fiber remaining.

#### *Preservation of Pollen*

It has been suggested in recent discussions that the occurrence of leaves and pollen of a variety of plants not known to be represented among the petrified stumps and logs is evidence that an unnatural assemblage is represented in the Yellowstone fossil flora and that the stumps must not be in position of growth. A brief statement on the interpretation of fossil pollen floras is essential, therefore. For a more comprehensive discussion, the reader should consult papers by Davis (1963, 1969, and others), whose recent contributions have placed the analysis of fossil pollen floras on a level of objectivity heretofore not attained by most European and American workers.

The study of fossil pollen and spores should contribute to our understanding

of the Yellowstone flora in at least two ways: (a) numerous pollen species should be preserved which are not preserved as macrofossils; (b) plants from beyond the immediate region of the fossil forests should be represented.

The first point hardly needs documentation, since it is the common experience of workers on contemporary lake, bog, river, and other sediments to encounter pollen and spores of scores of species from which no leaves or wood are found. Considering the many varieties of plants (including trees, grasses, ferns, etc.) in which pollen or spores are adapted for wind transport, the second point is self-evident. For example, in sediments of present-day tundra ("grassy" plains without trees) 80-90 percent of the total preserved pollen may be from nontundra plants — usually from forest trees growing in the general area, but some from trees such as oak, which are not found within several hundred miles of the tundra (Davis 1969:322). In fact, in contemporary sediments it is often impossible to distinguish between surface sediments in pure tundra, mixed forest and tundra transition, and northern forest by the proportional species representation of pollen alone (Davis 1969:323)

45

FIGURE 35/ Three-inch upright tree in a volcanic mudflow. Note abundant unsorted large volcanic boulders which have not damaged the tree or caused it to bend from the upright orientation. *Left.* . . . FIGURE 36/ Twenty-one-foot upright near the base of Plot 2 north of Specimen Creek. *Right.*



There are numerous habitats in which more accurate inferences are possible, but not necessarily by simple intuitive deduction based on proportional representation of fossil pollen. The pollen of pine trees may be two hundred times as common as the proportional basal area pine trees occupy (Davis 1963:903). On the other hand, conifers such as larch may be so underrepresented that they are completely missed in even relatively large samples. Only one larch pollen grain was encountered in 6,925 tree- and shrub-pollen grains from six surface samples in lake sediments where larch was present in the vicinity (Davis 1963:906-907). Factors of production, dispersal, decay, etc., must be evaluated quantitatively; and contemporary controls are highly desirable, if not absolutely essential, for significant inferences. Polunin (1960:181) makes the following observation:

In connection with the wide acceptance of sub-fossil pollen grains as evidence of former climates, the author cannot forget that through much of the summer of 1950 he found the most plentiful pollen in the air near the ground in West Spitsbergen to be that of *Pinus sylvestris*, the nearest trees of which were growing on the Scandinavian mainland several hundreds of miles away to the south. This indicates the need for caution in interpretation — including the desirability of statistical comparisons and, above all, avoidance of any tacit assumption that a small deposit or reasonable amount of an airborne pollen was necessarily produced locally.

The simple fact that some types are represented as pollen or leaves but are not represented by wood in the fossil forests must be expected, therefore, under any model of deposition.

In any paleofloral analysis it is also necessary to consider the possibility that species similar to living types may have changed in ecological tolerances at times. As is exhibited in nature today, phenotypically similar species often possess differing ecological requirements. One should expect to encounter ancient pollen assemblages for which there are no precise living counterparts. It is well known that such is the rule in many Mesozoic and all known Paleozoic pollen floras.

#### *Stumps, Not Trees*

Upright stumps on what appear to be growth levels are the commonest petrified remains. On some levels, prostrate logs are also common. This is exactly what one might reasonably expect if the basal ends of the trees and prostrate logs, such as are encountered below most forests, were covered by volcanic ejecta. Although the exposed and near-surface parts rot away, the covered basal stump portions of types more resistant to decay may be preserved, eventually becoming infiltrated by dissolved minerals from the mineral-rich ash and breccia. It is difficult to envision a transport mechanism which would break off the trees, sort out and dispose of the limby upper portions, break loose the stumps from the ground, transport them for many miles in an upright position, and bury them in volcanic deposits.



The condition of the top end of the stump, where not eroded or broken down by the forces that have removed the overlying strata, may be useful in inferring the history of the tree. In a transport hypothesis — recall — a force such as a high wind would need to break off vast numbers of trees and carry away many of the tops, so that mostly stumps remain. As far as we have been able to determine from limited observations on trees destroyed by major winds, such as the destructive 1962 storm in the Pacific Northwest, most trees tend to uproot rather than to break off under such forces. Trees that break display oftentimes a broad splintered zone, sometimes with the stump split to the base. Trees weakened by decay may exhibit more of a clean break. The tops of most of the fossil stumps that are still intact seem to have cleaner breaks. In the fossil forests it is not common to find prostrate trees with roots still attached. Data on living and fossil stumps is being gathered for further analysis.

#### *Differential Decay in Stumps and Surface Preservation*

The bark of fossil stumps and trees is rarely preserved, because of the impervious nature of bark tissue, which tends to inhibit mineralization. It is also quite possible that the less resistant sapwood may be lost at times. In petrified stumps of large dimension, the heartwood, or center, often is not preserved, leaving only a rim or a ring of petrified wood 6-16 inches thick around the tree, as though it had been hollow. The relative frequency of large petrified stumps without centers seems to be significantly higher than the frequency of hollow trees in living forests. This suggests that often the central deficiency may be a result of slow or incomplete mineral infiltration during the petrification process.

Though commonly the contact of the preserved fossil wood with the tuff or breccia is fairly sharp, in a few instances we have observed evidence of poor preservation, or decay, at the upper end or sides of fossil stumps. In such cases the rings at the exposed-end surface appear crushed, spread out, or otherwise distorted. Very rarely the upper surface wood may have the appearance of chip-board, which suggests that partial decay may have occurred before the terminus was covered and distorted by a load of rock detritus. In recently dead trees, decay patterns also vary considerably, in some cases fungal activity being superficial and in other cases permeating throughout the wood.

Occasionally *Sequoia* stumps extend or reach nearly to the root zone of the next level of stumps. This may indicate that the overlying surface, in turn, was covered by volcanic ejecta before a prolonged lapse of time, certainly during the first generation of tree growth. At several levels, partially buried trees remained, protruding through the breccia cover until the next young forest developed and was in turn also buried by volcanic cover. In such cases, the level of the younger tree

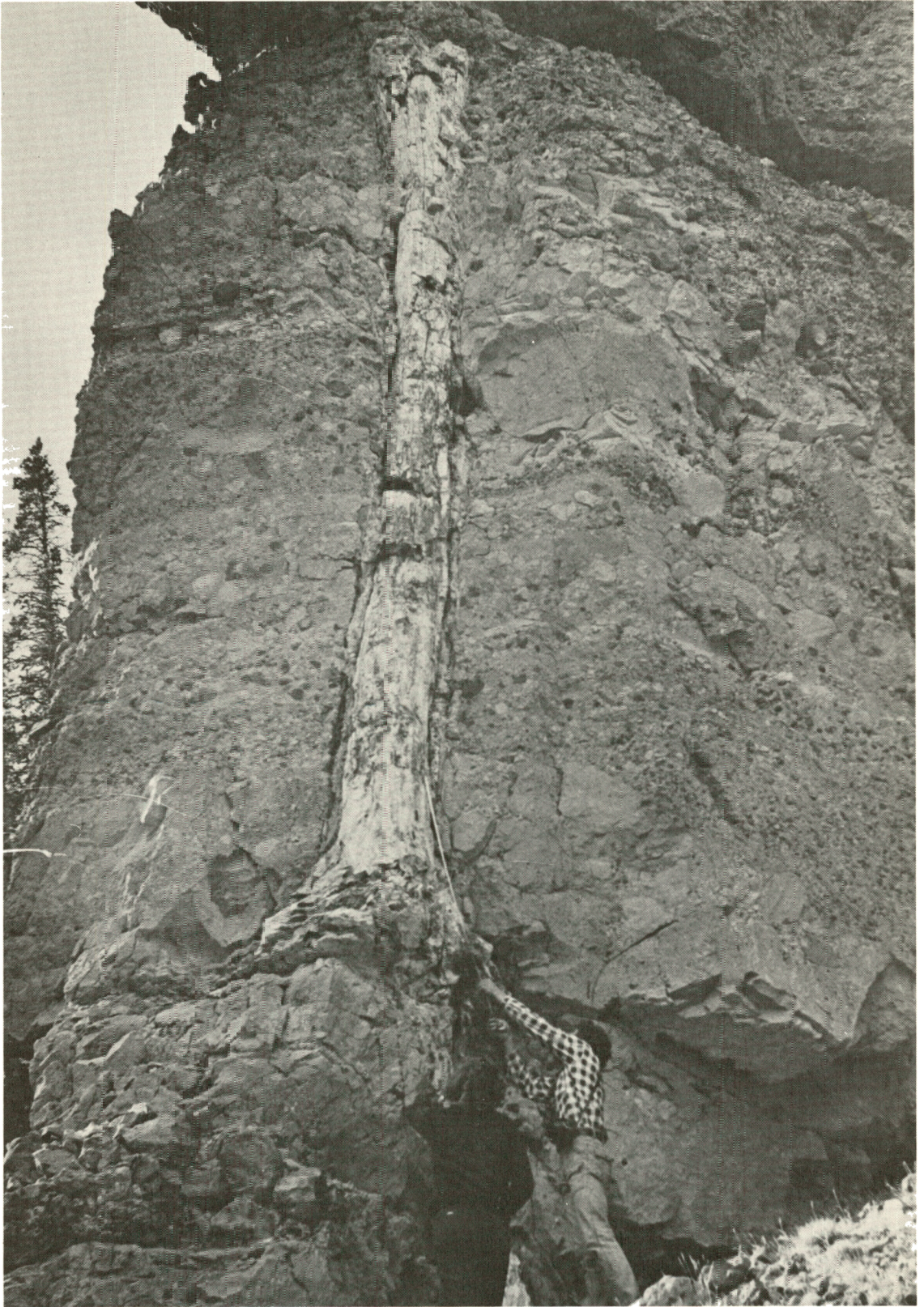


FIGURE 37/ Twenty-two-foot upright petrified tree exposed on a vertical cliff of breccia northeast of Daly Creek. Note that the trunk has begun to divide where it terminates not far below the next breccia level.

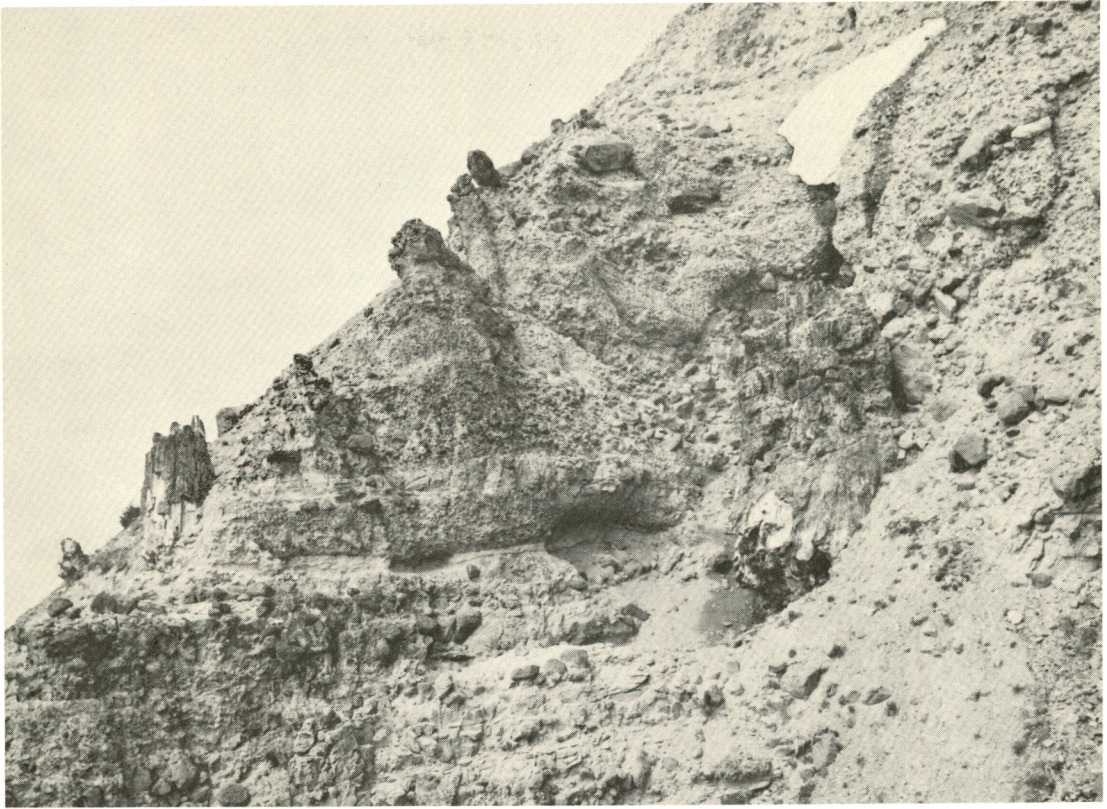


FIGURE 38/ Two of the series of large *Sequoia* on one of the levels of large stumps near the top of Ramshorn. *Above.* . . . FIGURE 39/ Twelve-foot *Sequoia* not far from those in FIGURE 38. *Below.*

roots overlaps the trunks of the trees or snags from the lower growth-level several feet above their bases. This phenomenon of small trees overlapping a level of older *Sequoia* stumps can be seen at the lowest two levels in the classic fossil forest locality of the Lamar River Valley, at a low level on Plot 2, and on levels 21 and 22 of the Specimen Creek slope designated Plot 1-B (FIGURES 43, 44).

In the latter location, numerous stumps on the upper overlapping level (22) have approximately 50 rings — which suggests that the large *Sequoia* persisted half a century or more protruding above the breccia as a dead snag while the new forest grew on top of the covering layer of breccia and ash. Additional evidence of the duration of a period of decades between the destruction of these forest levels is a peripheral ring or zone of decay of the snag at the level that intersects the second overlapping soil level. Here the trunk would have been exposed to the forces of wetting and drying that naturally promote decay. In FIGURES 43 and 44 it can be seen that the root level of the small stump continues across the large tree exactly where the zone of decay occurs. In the field it is far more distinct, since plant detrital material and abundant leaves mark the root zone of overlapping small stumps. We see no way that this phenomenon could occur without a period of years between the destruction of successive *in situ* forests.

#### ORGANIC ZONES

The presence of a soil zone with leaves, ground litter, roots, and rootlets corresponding perfectly with the root levels of the stumps, together with the erect condition and natural spacing of the stumps, seems to provide the most compelling evidence that the stumps are in position of growth. Since it is necessary, in developing a transport hypothesis, to suggest that these zones together with the stumps are brought in from a distant source, the nature of the organic zone needs to be considered in some detail.

At least two types of organic zones may be distinguished in the fossil forests. The first type is commonly associated with the root zones of trees and is composed of fossil leaves, detrital material, and roots and may be termed "soil."<sup>9</sup> The second, though sometimes referred to as a soil, is composed of fossil leaves but has none of the characteristics of a growing surface. In some areas and at certain levels, organic zones are not well preserved, but in the exposures north of Specimen Creek the preservation is superior.

#### *Soil Zones*

Most of the soil zones are characterized by the same basic features. The prominent portion of the soil zone usually ranges from 1 to 3 inches in thickness (FIGURES 4-10). Beginning at the top of the zone, one often finds well-preserved

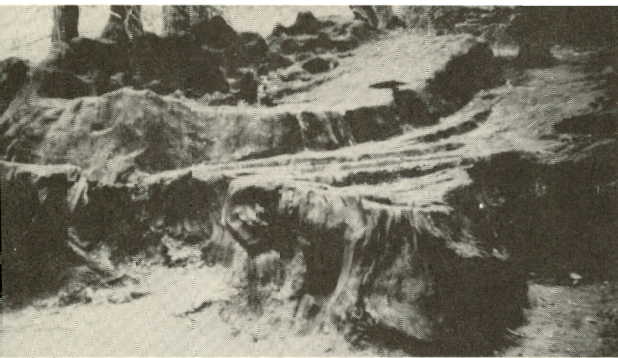
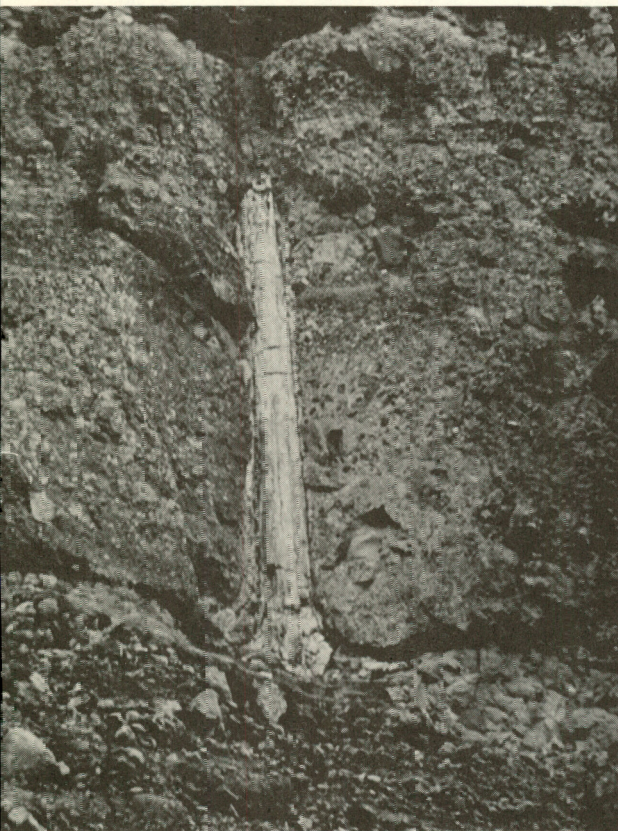


FIGURE 40/ Centennial stump in Kings Canyon National Park. Cut in 1875 for Philadelphia World's Fair. Note excellent preservation. (Photograph courtesy of Marilyn Lugenbeal; in 1967.) *Left, top.* . . . FIGURE 41/ Twenty-foot-tall tree in perpendicular cliff face. The top appears to have broken out from the overlying ground level about 3 feet above the upper end. Upper portion (1-2 feet) appears to have suffered some decay. *Left, center.* . . . FIGURE 42/ Petrified wood fragments such as are sometimes found at the upper end of the stump, where partial decay has taken place. *Left, bottom.* . . . FIGURE 43/ Overlap zone. Note decay in the large tree at the ground level on which the small overlapping level of trees was growing. *Right, top.* . . . FIGURE 44/ Close view of the same (FIGURE 43). *Right, bottom.*



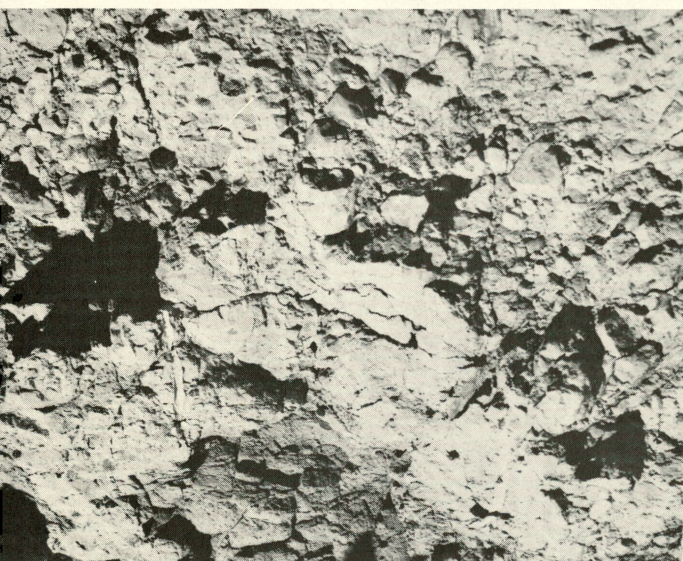


FIGURE 45/ Rootlets in tuff from soil zones. *Above, left.* . . . FIGURE 46/ Rootlets 4-18 inches below soil zone, level 24, Plot 1-B. *Above, right.*

FIGURE 47/ Small roots 2-3 feet below the ground surface (stump in FIGURE 49). *Below, left.* . . . FIGURE 48/ Molds where the roots have dropped out below in FIGURE 51. Many of the larger roots that were not well mineralized retained the character of wood fragments. *Below, right.*

FIGURE 49/ Examining tuff below  $7\frac{1}{2}$ -foot *Sequoia* for small roots (west end of Specimen Ridge, Lamar Valley). *Opposite.*

leaves and needles. As one proceeds down through the zone, there may be a higher concentration of less well-preserved organic remains, frequently a mass of needles, poorly preserved leaves, and other organic detritus a half-inch or more in thickness. Near the base of the zone, and below, occur what appear to be scattered roots and rootlets. If well displayed, these roots or rootlets may be distinguished from stems or above-ground parts by the irregularity of branching and shapes; this irregularity contrasts sharply with the regular patterns characteristic of the above-ground parts in flowering plants. Roots found range in size from about 1 millimeter up to large roots coming directly off the stumps (FIGURE 45).

Since in discussions it has been stated that small roots and rootlets are not preserved (or are present only in insignificant numbers in the organic zones) and that this is primary evidence of shearing off during transport, we thought that careful observations should be made on this feature. Undoubtedly only a fraction of the small roots are ever preserved; and roots, in contrast with leaves, do not conform to a bedding plane. Consequently, roots are less likely to be exposed or detected on fractured surfaces of the tuff and more likely to be overlooked than are leaves — which commonly conform to bedding planes and are frequently beautifully exposed. Careful examination reveals that some small roots are almost always present in the several inches beneath the organic detrital zone. Beneath some large stumps they may be found 2 feet and more below the original ground level. On level 24 in our Specimen Creek study Plot 1-B, there is a beautiful exposure of

53





FIGURE 50/ Lava Cast Forest near Bend, Oregon. Note large pine growing on essentially barren rock surface. *Left.* . . . FIGURE 51/ Same as FIGURE 50. *Right.*

fine roots on the side of a boulder from 4 to 18 inches below the soil zone. (FIGURE 46). At a number of locations where the organic zones were well preserved, we were able to observe roots and rootlets at and near the bases of stumps and at other locations along the organic zone.

In a sample of 25 levels in the Specimen Creek study plot, we made a careful check of every level with a well-preserved soil zone. Roots and rootlets, in each case, were found below the soil zones, as would be expected. Small roots and rootlets were also encountered (FIGURES 47-49) in comparative, but more limited, checks of the fossil forest exposures 40 miles to the east in the Lamar Valley and more than 100 miles to the southeast in the Stratified Primitive Area.

It has been suggested (Coffin 1968:6-7) that the absence of a thick layer of humic material (composed of dense mats of fine roots such as one may find under a temperate or boreal forest) is evidence that the organic zones associated with fossil forest root levels are the result of transport. Three significant factors should be considered.

First, because of the high degree and rate of biological decay under most forests in warm, humid climates, very little organic remains persist.<sup>10</sup>

Second, accumulations beneath a first-generation forest on volcanic ejecta cannot be thought comparable to the remains beneath many generations of forest growth. If one observes the sparse remains beneath first-generation trees on volcanic deposits in the vicinity of Sunset Crater (near Flagstaff, Arizona), Lava Cast Forest (near Bend, Oregon), or the volcanic beds north of Lake Kivu (in



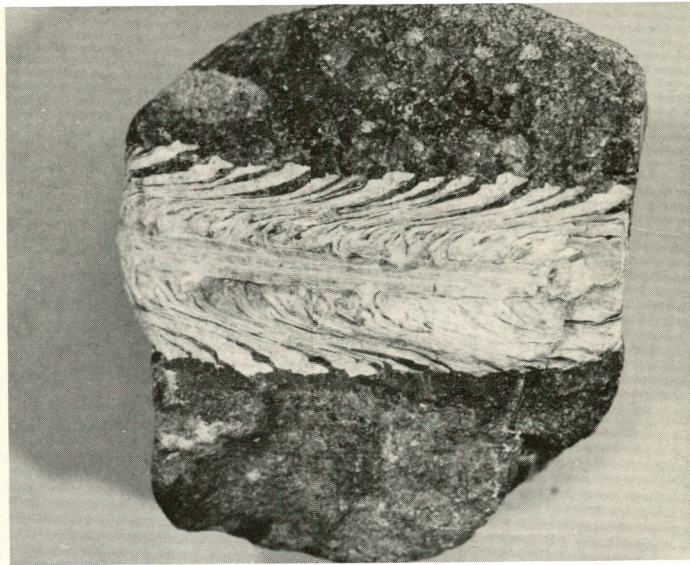
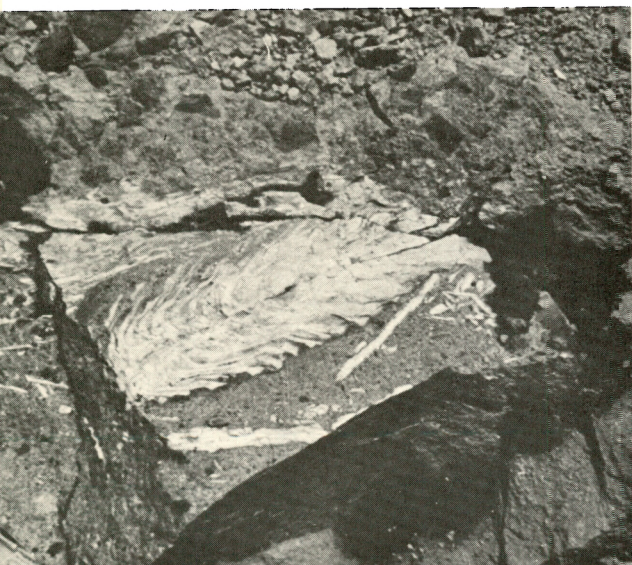


FIGURE 52/ Petrified pine cone from organic zone in Plot 1-B. *Left*. . . . FIGURE 53/ Petrified pine cone from loose rock in Specimen Creek area. *Right*.

East Africa), one cannot help being impressed by the areas of bare cinder or rock exposed (FIGURES 50, 51). The organic litter beneath a stand of Douglas fir 2-4 feet in diameter growing on the nearly bare surface of a lava flow in an area of high rainfall near Santiam Pass in the high Cascades of Oregon is so sparse and incomplete that the lava flow looks surprisingly fresh. Moreover, unless the rock matrix or cover that buries the soil level is fine material, even the sparse remains would not likely be preserved.

Third, this view fails to recognize the unequal likelihood of preservation of various plant parts. Fine roots include little of the resistant types of tissues most readily and regularly preserved. They are surrounded by bark, parenchyma, and phloem, with only a tiny strand of xylem. Bark is seldom preserved, because of the high proportion of phellem (or cork) tissue, cortex parenchyma, and phloem (tissues). Cork is impervious — therefore not subject to mineral infiltration as wood is. Phloem and parenchyma are delicate living tissues that are unlikely to persist until mineral deposits have been laid down in the cells by groundwater. By contrast, the xylem of wood (which tends to be resistant to decay) is a series of tubes readily permeated by mineral-rich groundwater and petrified by the deposition of mineral in the cell cavities. Roots several inches in diameter sometimes decay after the encompassing sediments have hardened, leaving only an empty mold (FIGURE 48).

It is undoubtedly for a similar reason that petrified pine and *Sequoia* cones are less common than petrified wood (FIGURES 52, 53). The tissues of the cone axis

and scales (not as readily infiltrated by mineral as wood is) are likely to decompose before petrification can occur.

### *Leaf-Drop Zones*

The second type of organic zone seems to represent a leaf-drop zone above the root level, not a soil zone, and consequently exhibits characteristics quite different from the soil zones. Such zones ordinarily occur in air-dropped ash from a few inches to several feet above the surface of the soil zone. They may be composed entirely of scattered, well-preserved leaves and needles, without the detrital material found in the soil zones. The leaves, as in the surface level of the soil zone, retain their natural texture and shape instead of the flattened condition characteristic of leaves that accumulate beneath water. These zones also lack the roots and rootlets found associated with the soil zone.

56

In present-day volcanic activity, similar circumstances may be observed. In the region of Mount Katmai, which ejected from five cubic miles of pyroclastic depos-

FIGURE 54/ Fossil forest breccias exposed in the valley of Frontier Creek in Stratified Primitive Area 140 miles southeast of the Gallatin Forest exposures.



its in June 1912, a snowlike layer of volcanic ash a foot thick covered the ground nearly 100 miles from the volcano. Much ash clung to the leaves and branches of standing trees, which tended to clog stomata and kill the leaves. In the weeks following, leaves and ash from the forests filtered to the ground. Wind removed ash from high areas and filled in the valleys. Two months after the eruption, Martin (1913:167-170) observed freshly fallen willow and alder leaves on the ash surface. Juanita Ritland (1968:27-29) cites many such examples (see also Dorf 1951:317). Some species may retain their leaves longer than others, giving rise to leaf zones with leaves of various species deposited in a nonrandom order above detrital material. Such post-eruption leaf-drop combined with wind and water reworking of the volcanic ash can also result in complex patterns in which organic zones appear to divide or split.

57

A failure to distinguish between postdepositional leaf-drop zones and organic zones associated with growth horizons may lead to mistaken observations on supposed soil zones.

FIGURE 55/ Fossil stumps were recorded at 15 levels on this slope, from about 9,000 to 10,500 feet. Wood is found up to at least 11,500 feet (in Stratified Primitive Area).



ABSENCE OF ANIMAL  
AND CERTAIN TYPES OF PLANT FOSSILS

Although fossil stumps, logs, roots, twigs, and leaves of trees and shrubs are common fossils at many levels, there are numerous types of organisms that are conspicuous by their absence. No land animals such as mammals, birds, insects, or spiders have been reported. Nor have any traces of fish, amphibians, aquatic insects, or marine or freshwater invertebrates been encountered. Among plants, the countless varieties of herbs such as lilies, orchids, buttercups, sunflowers, grasses, and a host of other common types have not been reported.

58

The suggestion that the absence of many types may have resulted from selective transport by water rather than from differential preservation hardly fits the data. If the fossils preserved and recovered represent a relatively unbiased sample of most of the life present in the area when the volcanic deposits were laid down, then selective transport must have operated at a high level. Among the woody plants one must have a source for are: (*a*) stumps with abundant roots, yet from which the trunks and branched crowns have been removed; (*b*) logs, twigs, a few limbs; (*c*) leaves and needles, plant detritus of about a hundred species of mostly trees and shrubs, together with a few ferns, but no leaves of the vast majority of herbaceous types.

The waters that transported the plant remains would have to leave behind the dead or living mammals, birds, insects, crustaceans, fish, or amphibians that may have been killed or displaced by whatever force broke off and uprooted the trees. The waters would also need to leave behind the stumps and logs of numerous species of trees represented by leaves only. The waters would need to leave behind all suspended particles of clay, mud, and silt, and all nonvolcanic sediments so characteristically transported by moderately active waters, particularly waters not enclosed within a streambed from which fine sediments have already been removed.

Such selective transport is extremely improbable on each of these counts, especially transport of organic remains without at least clay- and silt-sized sediments. Suspended sedimentary materials would be deposited as widespread thin clays or silts — which would be represented in the fossil forests, if present, by shales or siltstones. The total lack of such sediments easily distinguished from reworked volcanic sediments is one of the most serious objections to any transport hypothesis that would bring in organic remains from a distant source — the only possible source other than the shield volcanoes, which would hardly be an adequate source for 30 or 40 levels of forest remains.

To those who are familiar with the nature of fossilization and fossil-bearing formations throughout the world, the absence of animals and many types of

plants is not as strange as it might at first appear to be. The chances for various types of organisms to be preserved as fossils even under the most favorable circumstances are enormously unequal. Volcanic ash and breccia, like sandstone, have a high degree of porosity. Oxygen-rich waters filtering through volcanic deposits would tend to promote decomposition and solution of all except the more resistant remains. The less resistant woods, soft herbaceous plants, and animal materials would tend to disintegrate and be lost.

After early eruptions at Paracutin Volcano in Mexico, scientists observed that most birds and mammals, with the exception of field mice, migrated from the area. Deer and rabbits left first, followed by coyotes and other animals as their food supply was exhausted. Insects remained numerous. (Dorf 1951:317; Segerstrom 1956:23; Foshag and Gonzales 1956:129.) Williams (1962:21), the geologist, points out that animals killed by stream pollution, or suffocation, or after volcanic activity usually are devoured by scavengers or decay before being buried adequately for preservation.

It may be suggested that burrowing animals such as moles and gophers would not migrate. But two points should be recognized. First, burrowing forms would not be expected to thrive in substrates on which the fossil forests grew — volcanic tuff rich in fine volcanic glass fragments (Vaughan 1972:255-256). Second, the likelihood of small scattered bones being preserved or recovered in a porous substrate is minimal on both counts.

*Selectivity*, as usually seen in preservation, and the *exodus* of many forms seem to give the most reasonable explanation for the pattern of remains preserved in the fossil forest deposits.

FIGURE 56/ Forty-inch stump exposed on slope in FIGURE 55. *Left*. . . . FIGURE 57/ Distant view of stump and glacier-fed stream in Stratified Primitive Area. *Right*.



## REGIONAL GEOLOGY AND TRANSPORT

One of the most significant factors related to possible stump transport concerns the geological processes prevailing in the region at the time of forest burial and preservation. Because of the general and technical information required to evaluate this factor, only the major features essential to the point are stated here. Those who wish to may validate the facts by investigating the regional geology and stratigraphy of the central and northern Rocky Mountain region.

60 The sequence of events in the region is inferred from the thousands of feet of sedimentary and volcanic strata. In general terms, portions of the sequence relevant to the fossil forests are as follows: (a) widespread deposition of flat-lying sediments with marine fossils; (b) extensive beds with dinosaurs and other land types of animals and plants, including a few strange mammals; (c) more marine strata with fossils; (d) more land strata with fossils; (e) major uplift in Rocky Mountain ranges, creating basins and ranges (more than four miles of relative uplift; Upper Cretaceous to Lower Eocene); no marine sediments or fossils anywhere in the Absaroka Volcanic Field or the Rocky Mountain region subsequent to this time; (f) extensive erosion of mountains and filling of the basins; various fossil mammals and plants, including coal seams preserved in the basin fills; lake deposits in basins locally, especially in the Green River basin far to the south; (g) widespread intermittent volcanism, especially of the explosive variety, which gives rise to volcanic ash and tuff and burial of the fossil forests; no evidence of lake sediments or deposits anywhere in the Absaroka Volcanic Field.

The last evidence of marine deposits in the Rocky Mountain region is well below, clearly antedating the volcanic field and fossil forests (Robinson 1972:233). Incursions of fresh or marine waters, bringing in stumps, logs, and plant remains from beyond the boundaries of the volcanic field would bring in, at the least, thin but widespread layers of nonvolcanic sediments and leave characteristic sedimentary features. But, as has been stated, such layers are not found. The deposits radiate out from volcanic vent areas and exhibit marked local facies changes.

## GROWTH FEATURES

It may come as somewhat of a surprise that trees in natural stands of timber often exhibit more growth on one side than another. When the thickness of the tree-rings is measured in radii at various directions from the center of the tree, one side will generally be thicker (thus, a long axis in the cross-section resulting). There may be good reasons for this phenomenon. On the side of a tree exposed to prevailing winds, the branches are often less developed, because of increased evaporation from exposed leaf surfaces. This may be reflected in the development of wood on the same side, with resultant asymmetry in the cross-section of the tree



FIGURE 58/ Wood from the stump in FIGURE 59 exhibits the thinnest rings we have encountered (up to 40 or 50 rings per inch near the outer margin, with one interval of a half-inch with 48 rings).

trunk. Quite possibly other factors, such as intensity of radiation, may also have an effect. The distorted trees near timberline or on seacoasts, so frequently portrayed by artists or photographers, are an extreme example of the distortion resulting from prevailing strong winds. To a much less but still recognizable degree, this trunk asymmetry is exhibited in many forests.

From measurements made in a wide range of forest habitats in stands of lodgepole pine, ponderosa pine, Douglas fir, Sitka spruce, western hemlock, cedar, and redwood (whether in protected valleys or exposed slopes), our data indicate that the long axes tend to be somewhat parallel. Exceptions are to be expected in any stand — such as the adjacent surfaces of trees close together, streamside trees, and so forth — but the direction and trend are usually unmistakable. Although it is often difficult to make accurate measurements on petrified stumps, this same phenomenon in ring development seems to be exhibited on a number of limited samples measured. Again, a natural growth seems to be indicated. One might conjecture that such a directional orientation could be related to a corresponding asymmetry in the tree roots and a transport orientation. But when one observes the irregularity of the roots which have accommodated in growth to irregularities in the subsurface (boulders, water, etc.) rather than to atmospheric conditions, such an explanation seems highly improbable.

#### ORIENTATION OF PROSTRATE LOGS

Prostrate logs tend to show various degrees of directional orientation both in present-day forests and in the fossil forests. This is what would be expected — considering the influence of storms, prevailing winds, slope, and other environmental factors on the direction of tree-fall, as well as the effects from the deposition of volcanic sediments in the fossil forests. Any sample of exposed prostrate logs is biased because of the relationship between the orientation of the long axis of the log and the probability of exposure on a sloping outcrop. Hence, careful study of the factors governing exposure is required for a valid analysis of their orientation.

In twelve plots in a variety of exposed and protected situations, measurements of the direction of prostrate trees beneath living forests exhibited patterns similar to those recorded for prostrate logs in the petrified forests. Two exceptional localities with the greatest number of parallel trees among living or fossil trees were encountered beneath living forests on the slopes of Mount Lassen (in California) and under stands of lodgepole pine north of West Yellowstone. Both of these areas had been subjected to unusual windstorms in recent years.



## CONCLUSIONS

63 The picture which emerges is that the significant lines of evidence find their most natural interpretation according to the generally held model of trees in position of growth. Although a few features (such as orientation of prostrate logs or prevalence of conifers) could easily accord with any model, a number of findings seem to have no other feasible explanation than that the remains are *in situ* (in position of growth): the perfectly erect orientation of even, tall, slender tree stumps; the natural spacing; the character of leaf preservation; the "soil" zones; the existence of stumps without the tops of the trees; the differential decay on stumps; and still other factors. Moreover, the distribution of stumps in relation to volcanic centers or vents and the absence of any marine sediments or freshwater sediments (such as shale or siltstone that would inevitably be brought in if transport from a distant source had occurred) seem to rule out transport except from the shield volcanoes. In no way could such volcanoes be an adequate source for the stumps, logs, and other organic remains.

There is no question that the time problem to which the fossil forests contribute has an important bearing on fundamental theological issues. We are entirely sympathetic with any thorough and careful effort to solve the problem by endeavoring to encompass earth history in a short period. Nevertheless, as we have carefully studied the fossil forest outcrops throughout the volcanic field and evaluated the converging lines of data bearing on their deposition, together with the broader geological picture in which they fit, the weight of evidence has led us to conclude that successive forests are represented.

This is not to imply that the Inspired Record is wrong. But it is to suggest that our understanding of its essential message may not always be perfect or complete. It is to suggest that we Adventists, as conservative Christians, might well make a renewed search of both science and revelation to discover those subtle relationships and insights that may help to demonstrate the consistency and harmony that exist between truth from the two sources. We are confident that the ultimate resolution will require neither distortion of facts nor grossly unnatural interpretations in either science or revelation.

## WHAT WE DO NOT KNOW

We close with a passage by Richard Foster Flint (1941), emeritus professor of geology at Yale University, from an introductory book on geology. This selection, entitled "What We Do Not Know" (a subtitle we have borrowed), can appropriately be applied to this article — and indeed to most other articles in both science and theology!

Much of the information contained in this book is within the well-lighted zone of proved fact. But no one ought to embark upon a study of even the elements of geology without realizing that we quickly pass from fact into a twilight zone of inference in which we can say, not "This is true," but only "Probably this is true," and that thence we pass into a region of darkness lit here and there by a guess, by speculation. Speculation is a legitimate and desirable thought process just as long as the thinker fully realizes that he is only speculating. But when he speculates, and at the same time persuades himself (and also, alas, his listeners) that he is drawing sound inferences, then knowledge does not progress. The reader of this book should remember at every page that fact, inference, and speculation are three wholly different things, that "We do not know" must be said or implied at nearly every turn, and finally that *what we do not know at present* would fill an indefinite number of volumes, many of which, we hope, will in the course of time be written.

Only — let every man take heed, lest he comfort himself with the dangerous assumption that the factual and the firm elements of science are mere speculation, and thereby seek to escape the intellectual responsibility of facing the issues and the hard decisions that the times demand of conservative Christians.

64

#### NOTES

1/ The term *soil* is here used in a nontechnical sense, as discussed later in the paper.

2/ Brown (1957) reports 32 levels, and Dorf recognizes 27 levels in the Lamar Valley exposures about 50 miles east of the Specimen Creek locality.

3/ It is quite possible that these volcanics may be genetically related to the vast Columbia River Plateau field that blankets 200,000 square miles in Oregon, Washington, Idaho, and northernmost California, generally younger but where its roots are exposed (Clarno Series) nearly equivalent to the volcanics of northwest Wyoming (cf. Van Houten 1969:1506-1508).

4/ Along the margins and deeply eroded areas within the volcanic field, volcanic rock may be seen lying directly on top of older strata ranging from Precambrian to Paleocene and Lower Eocene levels. The reason for the various levels immediately below is that major mountain uplift and erosion throughout the Rocky Mountain region (Laramidian orogeny) left exposed Precambrian rocks in the mountain "cores" and successively younger strata as one proceeds toward their flanks. And it was on this deformed heterogeneous surface that the extensive volcanic ejecta which entombed the fossil forests were deposited.

5/ For precise definitions of the various classes of volcanoclastic sediments and rock types, see Fisher (1960, 1961) and Parsons (1969).

6/ Concerning levels in which fewer stumps are preserved, see the discussion in the paragraph following the data on the age of stands referred to.

7/ Three perceptive analyses of this phenomenon, each from a somewhat different perspective, are recommended: (Lyell 1851; Newell 1959; Simpson 1960).

8/ Knowlton (1899:651-791, 773) reports about 150 species. More recent studies generally tend to reduce the numbers reported by earlier workers on fossil floras by recognizing greater variability in species.

9/ The term *soil* is used in this article in a nontechnical sense. One would not expect below these trees, most of which must represent, as we shall see, the first generation of arborescent growth on volcanic ash or breccia, a fully mature soil with well-developed A, B, and C horizons. Such horizons are the products of rock weathering, together with plant decomposition products of not one, or a few, but sometimes scores of generations of trees and other plants. Moreover, since soil in any stage of development is characterized by high rates of biological activity that may tend to continue for a time after burial, it is particularly vulnerable to the destructive forces of diagenetic change (decomposition of A zone particularly). Caution in the use of the term *soil* in reference to fossil deposits, which is always indicated, is particularly necessary here. The terms *organic detrital zone* or *organic zone* may be helpful to avoid mistaken connotation.

10/ Dorf (1960), judging by the flora, concluded that the climate probably varied from warm temperate in the rolling uplands to subtropical in the lowland, with rainfall being 50-60 inches per

year. That the breadfruit, figs, laurels, and bays found in the forests are all more at home today in subtropical and tropical than in temperate forests suggests very moderate conditions. There were also many warm temperate types. The climate may have been similar to that found in southeastern United States and parts of Central America today, a climate that favors prolific growth. However, such a climate also provides good conditions for rapid decay, so that very little humic material is accumulated, even after many generations of for-

est growth. In tropical rain forests today, conditions are such that very little humic material is allowed to collect. After a rain forest is slashed and prepared for agriculture, the area is productive only one to three years. In many areas the soil is red, indicating a high degree of oxidation (see Richards 1963:63-65). Plant geographer Polunin (1960:437) states: "The forest floor normally is covered by a thin litter of leaves, and commonly shows through in frequent bald patches, or these last may support cryptogams."

#### LITERATURE CITED

- Andrews, H. N. 1939. Notes on the fossil flora of Yellowstone National Park with particular reference to the Gallatin region. *American Midland Naturalist* 21:454-460.
- Andrews, H. N., and Lenz, L. W. 1946. The Gallatin Fossil Forest (Yellowstone National Park, Wyoming). *Missouri Botanical Garden Annals* 33(3):309-313.
- Beyer, Arthur F. 1954. Petrified wood from Yellowstone Park. *American Midland Naturalist* 51(2):553-567.
- Brown, C. W. 1957. Stratigraphic and structural geology of the north central-northeast Yellowstone National Park, Wyoming and Montana. Ph.D. thesis at Princeton University, Princeton, New Jersey. 178 pp.
- Chapman, Wendell, and Chapman, Lucie. 1935. The petrified forest. *Natural History* 35(5):382-393.
- Coffin, Harold G. 1968. Research on the petrified forests of Yellowstone, a progress report. Unpublished manuscript. 27 pp.
- Coffin, Harold G. 1969. Research on the classic Joggins petrified trees. In *Creation Research Society Quarterly*, vol. 6. Nutley, New Jersey: Presbyterian and Reformed Publishing Company.
- Cook, Melvin A. 1966. *Prehistory and earth models*. London: Parrish. 353 pp.
- Crandell, D. R., and Waldron, H. H. 1956. A recent volcanic mudflow of exceptional dimensions from Mount Rainier, Washington. *American Journal of Science* 254(6):349-362.
- Davis, Margaret Bryan. 1963. On the theory of pollen analysis. *American Journal of Science* 261:897-912.
- Davis, Margaret Bryan. 1969. Palynology and environmental history during the quaternary period. *American Scientist* 57(3):317-322.
- Dorf, Erling. 1951. Lithological and floral facies in the Paricutin deposits, Mexico. *New York Academy of Sciences Transactions*, series 2, 113(8):317-320.
- Dorf, Erling. 1960. Tertiary fossil forests of Yellowstone National Park, Wyoming. In Billings Geological Society: *Guidebook [for the] Annual Field Conference*, 253-260.
- Dorf, Erling. 1964. The petrified forests of Yellowstone Park. *Scientific American* 210(4):107-114.
- Fisher, R. V. 1960. Classification of volcanic breccias. *Geological Society of America Bulletin* 71(7):973-982.

65



FIGURE 59/ Eleven-foot *Sequoia* near the ridge crest above Daly Creek in the Gallatin Mountains.

- Fisher, R. V. 1961. Proposed classification of volcanoclastic sediments and rocks. *Geological Society of America Bulletin* 72(9):1409-1414.
- Fisk, Lanny H., and DeBord, Phil. 1974. Plant microfossils from the Yellowstone Fossil Forests: preliminary report. In Geological Society of America: *Abstracts with program* 6(5):441-442.
- Flint, Richard Foster. 1941. In Longwell, Chester Ray; Knopf, Adolph; and Flint. *Outlines of physical geology*, second edition. New York: Wiley. 381 pp.
- Hague, A. 1896. The age of the igneous rocks of the Yellowstone National Park. *American Journal of Science* 4(1):455, 457.
- Hall, W. B. 1961. Geology of the Upper Gallatin Valley of southwestern Montana. Ph.D. thesis at the University of Wyoming, Laramie. 239 pp.
- Holmes, William Henry. 1878. Report on the geology of the Yellowstone National Park. In *U. S. Geological and Geographic Survey, territories of Wyoming and Idaho* (1883 edition): twelfth annual report, pt. 2, pp. 1-57.
- Jones, Donald G. 1968. General description of the soil zone chart. Unpublished manuscript.
- Knowlton, Frank Hall. 1899. Fossil flora of the Yellowstone National Park. In *U. S. Geological Survey: monograph* 32, pt. 2, chap. 14, pp. 651-882.
- Lugenbeal, Marilyn P. 1968. Evidences bearing on the time involved in the deposition of the fossil forests of the Specimen Creek area, Yellowstone National Park, Montana. M.A. thesis at Andrews University, Berrien Springs, Michigan. 85 pp.
- Lyell, Sir Charles. 1851. Anniversary address of the president. *Quarterly Journal of the Geological Society of London* 7:32-75.
- Lyell, Sir Charles. 1853. *Principles of geology*. New and entirely revised edition (ninth). New York: D. Appleton and Company. 834 pp.
- Martin, George C. 1913. The recent eruption of Katmai Volcano in Alaska. *National Geographic Magazine* 25(2):131-181.
- Newell, Norman D. 1959. The nature of the fossil record. *American Philosophical Society Proceedings* 103(2):264-285.
- Parsons, Willard H. 1967. Manner of emplacement of pyroclastic and andesitic breccias. *Bulletin Volcanologique* 30:177-188.
- Parsons, Willard H. 1969. Criteria for the recognition of volcanic breccias: review. Geological Society of America: *Memoirs* 115:263-304.
- Polunin, Nicholas V. 1960. *Introduction to plant geography and some related sciences*. New York: McGraw-Hill. 640 pp.
- Read, Charles B. 1933. Coniferous woods of Lamar River flora, pp. 1-19. Fossil floras of Yellowstone National Park. Carnegie Institution of Washington: *Contributions to Paleontology*, no. 416, pt. 1, pp. 1-19.
- Richards, Paul W. 1963. The tropical rain forest. *Scientific American* 229(6):58-67.
- Ritland, Juanita H. 1968. Fossil forests of the Specimen Creek area, Yellowstone National Park, Montana. M.A. thesis at Andrews University, Berrien Springs, Michigan. 62 pp.
- Robinson, Peter. 1972. Tertiary history. In Rocky Mountain Association of Geologists: *Geologic atlas of the Rocky Mountain region, U.S.A.*, ed. William W. Mallory, pp. 233-242.
- Sanborn, William B. 1951. Groves of stone: fossil forests of the Yellowstone region. *Pacific Discovery*. May-June, pp. 18-25.
- Segerstrom, Kenneth. 1956. Erosion studies at Paricutin, State of Michoacan, Mexico. *U. S. Geological Survey Bulletin*, no. 965-A. 164 pp.
- Simpson, George G. 1960. The history of life. In *Evolution after Darwin*, ed. Sol Tax (3 vols.) 1:117-180. Chicago: University of Chicago Press.
- Smedes, Harry W., and Prostka, Harold J. 1972. Stratigraphic framework of the Absaroka Volcanic Supergroup in the Yellowstone National Park region. *U. S. Geological Survey: professional paper* 729-C. 33 pp.
- Van Houten, Franklin B. 1969. Molasse facies: Records of worldwide crustal stresses. *Science* 166:146-148.
- Vaughan, Terry A. 1972. *Mammalogy*. Philadelphia: Saunders. 463 pp.
- Wedel, Waldo R.; Husted, Wilfred M.; and Moss, John H. 1968. Mummy Cave: Prehistoric record from Rocky Mountains of Wyoming. *Science* 160:184-186.
- Weed, W. H. 1892. The fossil forests of the Yellowstone. *The School of Mines Quarterly* 13: 230-236. New York: Columbia College.
- Whitcomb, John C., and Morris, Henry M. 1961. *The Genesis flood*. Philadelphia: Presbyterian and Reformed Publishing Company. 518 pp.
- Wieland, George R. 1935. *The Cerro Cuadrado petrified forest*. Carnegie Institution of Washington: publication 449. 180 pp.
- Williams, Howel. 1962. *The ancient volcanoes of Oregon*. Eugene: Oregon State System of Higher Education. 68 pp.

# The Ordination of Women: Insights of a Social Scientist

JAMES L. SPANGENBERG

67

The insights of the author are reprinted (by permission) from *What Is Ordination Coming To?* This 1971 report of the Geneva, Switzerland, Consultation on the Ordination of Women was prepared by the World Council of Churches (Department on Cooperation of Men and Women in Church, Family, and Society).

As a social scientist, I am glad to share the results of my study of the issues concerning the ordination of women. A few cautionary statements would seem to be useful at the outset. It is important to avoid or carefully temper any "statements of universality." It is risky when one says "all" or "always" when referring to human behavior. There "almost always" needs to be some qualification; limits need to be set to the application of statements of fact about human behavior. Hardly any statement I make, if any, is a universal truth. These generalizations are less true or useful in some circumstances than in others. Similarly, I am not willing to attempt "single-cause explanations" about so complex a study as human behavior.

The scientist attempts to establish propositions and generalizations that are useful. For him, what is true is that which is useful to his purposes. Hence, opposing statements of reality can be used to explain, control, predict, or even just describe different aspects and views of that reality about which a simpler, more parsimonious statement cannot be made. There are levels of reality and experience that cannot yet be reduced to scientific measurement without destroying or omitting certain particulars in the reality measured. The artist or philosopher, the poet or theologian, may be better able to convey understandings about some dimensions of the human experience than can the natural or social scientist. Conversely, some things the poet and artist can do only very poorly and inappropriately.

It is possible, intellectually or emotionally, to divide the concerns of the human experience into separated disciplines — biology, anatomy, sociology, psychology, and theology, for example. But in day-to-day operations, we rarely experience our lives in neat intellectual categories. It is important to realize, for example, that I do not function even now in a purely sociological dimension, even though my core discipline is sociology. In fact, I will be affronted if you reduce me to the category of “sociologist,” just as you should be affronted if I reduced you to the category of theologian or ordained woman. Each of us is more than a role identity; we are more than a label can convey.

Another cautionary point: I cannot bring to your attention in a short paper all the insights that I have been able to identify as relevant. This is true in spite of the limited attention given by social scientists to women in the church or in the ministry. Thus I shall present a choice of issues that seem to me crucial to remember. My goal is usefulness rather than exposition of social laws or ultimate truth. Whatever final statements are made, we will have had to deal with these issues or ideas, I believe.

## I

Developmental psychologists remind us that human behavior is influenced to varying degrees by several dynamics. Our genetic heritage as individuals sets some limits on what we can do or become. The interplay of nongenetic physiological factors — nutrition, hormones, exercise, and physical trauma — are limiting and enabling factors. Many of our changes in behavior are the results of learning. We learn when our behavior changes in terms of ways of thinking, feeling, or acting from experiences we have had. Our behavior also changes as a result of our interaction with other people — called social learning, socialization, and acculturation. In addition, I believe that operative for all of us are certain idiosyncratic and individual factors resulting from choices, perceptions, interpretations, and responses. The bugaboo or tormentor of the neat scientist is the problem of will and choice. I know of no ordering of these factors which is successful in the sense that it pleases a significant majority of scientists. I merely state that it is my judgment that nature, nurture, and choice, all, are important in what human beings are to be, to do, or to become. My theological insights support this and add the notion that the purposes of God work here as well, though it is not at all clear to me now how he works and even when he works.

A sociocultural analysis of societies highlights the saying that “our ways are not the only ways of behaving.” One of the pervasive temptations humans face is to take a solution that has been successful in one context, and impose it in another context. We can and do learn from one another, and there are lessons in the past.

But there are many ways by which most human goals can be accomplished. From my training I have become aware that a plurality of patterns of behavior is the human condition. Yet, even here I get intimations that some feel there may be only one right way. It may be that we forget that there is a distinction between ways and The Way.

The social sciences remind us that similar behaviors can have very different meanings, and very different behaviors can have similar meanings. As I age, more and more I conclude that the meanings of the behaviors are often more important to me than the behaviors apart from their meanings. Wearing a clerical robe can mean anonymity, gratification of feminine strivings, or a position of status! Or it can be an assertion that one belongs to an ancient order of distinction. The meanings you get from my talking-behavior are central — no matter what my intentions are.

69

Our cultures program us or socialize us to behave in predictable ways in particular situations. There is usually allowed a degree of deviance from the norms; but if extreme, such deviance can be disruptive and socially expensive, especially when it is flaunted. For example, all over the world, men do not mind being dominated by their wives (henpecked, we call it) as long as the man and his world do not know about it. (South American congregations can accept women priests when they don't feel they will be shamed for it.) Furthermore, we redefine or relabel behaviors so that they are within the definitions of our culture. Some Moslems can eat pork, as long as it is called something else. Certain behaviors become "unthinkable" because we have been taught that such behavior is not for us.

Yet much of human behavior is "scripted behavior" — humans have very few innate patterns of response that persist unchanged after the first few months of life. All that is clearly "human" behavior is learned behavior, and thus it is that the sins of the father are visited upon the child, just as their virtues are handed on, although our choices change the mixture. Even motherhood is learned behavior. From this perspective, women can learn to do anything that men can do except as biology limits and society permits. Women can learn to be ministers, and people can learn to interact as well with female ministers as with male ministers, with a new minister as with an old familiar one.

## II

Social structures have to be maintained by certain patterns of roles through which functional needs are met. The maintenance of the structures essential for social survival — the identity of the actor — is usually less important than that the activity is provided for in the social system. The limiting factor has to do with interpersonal relationships — the involvement and investment of self in another

person. Deviation from the established norm of the qualifying identity is easiest in times of crisis and change. The deviations are even easier if the deviator is unimportant or if the deviation is somehow masked. If the people are used to robed ministers, a robed minister may be accepted sooner than one who is not robed — the gender identity is masked.

Where available job-fillers possess special qualifications or attributes that are essentially valuable at that time, the admission for the new type of job-filler is much more rapid. When they immediately begin to fill a deep need, assimilation is still more rapid. The early women ministers in America were outstanding persons, with rich endowments, and possessing a deep sense of call and commitment. The availability of appropriately gifted and trained persons makes it easier to change the rules that interfere with useful procedures.

70

Every group must devise ways of replacing members and of socializing the new members. Otherwise the group dies. The Shaker communities in America provide a case in point. They failed to enlist and socialize new members — and it was not because their gifted leader was a woman!

When a social group develops a new basis for categorizing its members, the role assignments will tend to reflect this new basis. The process usually occurs only gradually and under pressure. Where personal experience is the basis for leadership, as in the indigenous churches in Africa, women have frequently been the chief ministers. Where the old secular disfranchisement of women, the poor, or the bonded was maintained, only the elite were eligible, and it was very difficult to break into the power block. The greater the degree to which the decision-making powers (usually the ultimate power) are held by an elite, the more difficult is the lot of the dispossessed as they seek to participate in decision-making power on the use of church moneys, *except* at the point of deciding not to give money!

The more diffused decision-making becomes in the social structure, the easier it should be for new categories of job-fillers to enter the various categories of participation — including the orders and rites of high symbolic and power status. Competence, not membership in an elite class, is the mark of the leadership of the community. It may be that part of the resistance to ordination of women is related to the struggle to maintain the position and powers of the elite groups. I have not made a careful test, among the churches, of this generalization, though my experience bears it out. The subjugation of women in the churches is only partially due to their lack of power and their unwillingness to use the power they have. After all, the elite tend to be the men of their families and/or their respected leaders. But the control of power is a central issue here, I believe.

Examination of the literature reporting role behavior research reveals that not



all problems in role relations arise from disagreement as to role qualifications or expectations. Some difficulty arises from the fact that each actor brings his own personality with him — difficulties often arise because the minister (or some parishioners!) have personality problems. We all are tempted to explain our difficult times by speaking of the “persecution of the saints,” when an objective observer would report that we are simple cases of “difficult people.” Some roles are difficult because of the internal contradictions in the role. My research indicates that the ministry role has just such internal contradictions. Many of the difficulties women ministers have are very likely characteristic of all ministers, or even of most people, whatever the role. From time to time it would seem to be a poor matching (able people misplaced).

71 In addition, some of our role difficulties relate to the inadequacy of the rewards systems. It is tempting to use an obvious thing like gender identity to explain problems when the gender factor is a magnetic cover-up for other less admissible motives for objections or less admissible explanations. The real source of difficulty may be incompetence or inappropriate preparation for the situation, or maladjustments in the social process, or unwillingness of the group to reorder priority or to deal with changed circumstances. Our relations may be destructive, inhumane, or lacking in Christian grace. The high level of performance of many women ministers, where they have been accepted, indicates that when the difficulties are present, or when they develop, they are not primarily due to the female character of the minister but to other factors, some of which have nothing to do with her even as a person.

It tends to be far easier to say that the churches consider it improper for a woman to be a minister than to say that we in the congregation are too rigid to respond to God’s new directions for the church, or that we are too jealous of our power position, or that we prefer to keep all women suppressed because we feel too incompetent to compete with them or work alongside them. Most societies seeking to resist the pressures to respond to changed conditions will grab any rationalization to justify their resistance, and the “will of God” proclamation has a powerful impact among those who love or fear God. Added to this is the noticeable tendency among God’s spokesmen to assume the prerogatives of God — to try to be God. As a Christian, rather than as a social scientist, I consider this to be the most pervasive temptation with which all of us have to wrestle: “to be as God” when we are so woefully unqualified. This may be part of the psychodynamics involved in the extreme opposition of many males to entry of women into the ministerial orders of the churches. That many women join the opposition is not surprising when one notes the effect of the oft-repeated and self-affirming definition that women are not competent, capable, or qualified. The same psycho-

dynamics operate for other suppressed peoples, both in the Christian community and in the secularized pseudo-Christian nations.

### III

72 Examination of the available case histories of women ministers indicates to me that few people become able to learn new behaviors regarding the ministry from reading books or from the application of accepted principles. Most people need a more powerful teacher — that of a competent model and personal experience with a capable minister, part of whose identity and resource is that she is female. The cases available are too few to be sure, but it would seem that the first women ministers in a community must be unusually competent and have a particularly difficult beginning experience. Where the woman minister is no longer seen as a pioneer, she is routinized as readily as are male ministers. Where she is successful in the eye of the decision-makers, the woman minister sets a model for future appointments. But where she is not so defined by the decision-makers, her womanhood will be given as the core problem. Since the church community behaves so much like the external orders, it should not shock us that this is so — though it should disturb us greatly.

An almost universal characteristic of social humans is that they behave very much in terms of their definitions of what the situation is. It is on this basis that “self-fulfilling prophecies” work. We decide the situation is a certain way, and then we begin to behave in the ways that make that situation develop into just what we defined it to be. We define a group as inferior, and then we treat the members in ways that make sure they will become inferior! Such a self-fulfilling prophecy is often at work with respect to the ability (or inability) of women to become ministers.

Whatever the biblical and theological insights are about the importance of gender in the distribution of responsibilities and opportunities in the life of the churches and the Church, the social sciences do not seem to give support to the notion that current gender distinctions in the churches are either necessary or useful in this present world, in terms of our stated values and goals. Even where we take into account the biological realities of gender and sexual distinctions, it becomes clear that there is more difference between the members of one sex in terms of biological patterning and potential than there is between the averages of the two sexes. Our stereotype of an absolute difference, a difference of kind rather than degree, is supported by neither the biological nor the social sciences.

Even contemporary modes of dress are upsetting our sexual stereotypes as to what is gender-appropriate. Once again males are wearing fancy attire and bright colors. And have you forgotten that women wore pants first, and that men used

to paint their faces? Our folklore can proclaim a complete difference between male and female, and our appreciation or depreciation of unique sexual qualities can continue. But male and female are more alike than they are different. I think we may be on the verge of a universal discovery of our common humanness — our common humanity is more significant than our sexual distinction. As a seeking Christian, I am disturbed that too often our theological formulations reflect contemporary culture rather than play a part in reshaping the status quo.

The social sciences can help us to explain why women are not being ordained, or why they are not allowed to be ordained, or why they continue to be the largest dispossessed category of people both in the churches and the larger society. I can even make some predictions as to where strains and stresses will appear in the social fabric of the churches and where women are more likely to be recognized for their competence and their potential as persons.

73

I do not find evidence in the social sciences that this pattern must continue, or that it needs to continue, or that it is useful in terms of the goals and values of the churches for it to continue. Nor do I find any evidence of the religious institutions disintegrating where women are treated as full persons as much as men are. Rather, it appears to me that the Church is more visible in the churches where gender distinctions are lost in the discovery of the personhood actuality or potential of every human creature. We have too long let the cultural realism of Paul hide the more universal and fundamental insight of that same man regarding the significance of God's action in Christ in breaking down the walls between all categories of God's continuing creation in man.

# That Wedding Ring

ROLAND CHURCHMAN

74

The wearing or nonwearing of wedding rings has been a source of endless contention in the Adventist church. It is one of those issues that is never put to rest — largely because it relies more on the advice of Ellen White than on the teachings of Scripture. Many Seventh-day Adventists, deeply troubled by the fact that more and more young Adventist women *are* wearing wedding rings, conclude that the standards of the church are slipping and that the love of many waxeth cold. To them, ring-wearing proves that the influences of the world are creeping in and undermining the purity and clarity of the message of the church.

Since this not-so-great controversy is not going to go away, perhaps a new approach is in order. The issue could be largely resolved if it were addressed in a manner somewhat different from that employed in the past. This new approach would not challenge the authority of Ellen White but would question the interpretations many church leaders have placed on her counsel. That is, the problem could be translated from the question of fidelity toward the teaching of Mrs. White to the question of *finding of fact* applicable to her interpretation.

As most Adventists know, Mrs. White did not categorically forbid the wearing of wedding rings. She wrote, "In countries where the custom is imperative, we have no burden to condemn those who have their marriage ring; let them wear it if they can do so conscientiously."\*

Although she found prohibition appropriate for the America of her day, it does not necessarily follow that the same prohibition is applicable to the America of 1975. Whatever the practice may have been in the past, there is little doubt that the practice of wearing a wedding ring in America today is just as socially imperative as it is in many countries where wearing was permitted by Mrs. White — and is condoned by the church today. If the church wished, it could make a simple *finding of fact* that the wearing of the wedding ring in contemporary America is supported by the same firmly rooted social conventions as those that led Mrs. White to tolerate its use abroad.

This finding would not then involve a repudiation of the teachings of Mrs.

White. It would require only a reassessment of the conditions that prevail in our country. Such a finding by the church would result in impressive advantages.

1. It would go a long way toward terminating an issue that has proved vexing and wearisome over the years without “producing the peaceable fruits of righteousness.” The issue has led, rather, to a great deal of petty gossip, of being judgmental, and of preoccupation with a most peripheral matter at the expense of major Christian concerns. It is a bit difficult to believe that Christians should not have weightier matters on their minds than whether so-and-so wears a wedding ring.

2. It would spare church members much unnecessary discomfort when explaining the church position to friends of other faiths. Most members are eager to discuss their faith with others. But there is a distinct reluctance to discuss this particular belief — largely because the church position does not have the solid biblical support that the major doctrines have.

3. It would spare Adventist women frequent unnecessary embarrassments, including occasional misunderstandings of a somewhat serious nature — as when a couple occupies a motel or hotel room and the employees notice with interest that the woman wears no wedding ring. And what about pregnant Adventist women without wedding rings? Is it really necessary for these women to be regarded as of loose and promiscuous character? Doesn't the Bible say we should avoid even the appearance of evil?

4. Most importantly, by all odds, it would lead to more effective evangelistic campaigns. How every evangelist must dread the moment when he has to ask the potential woman convert to give up her wedding ring! How he must wince at the effect this will have on her possibly interested but as yet unbelieving husband! The evangelist knows from his own experience, or that of others, how many women have accepted the full array of church doctrines, including the Sabbath, only to draw back when asked to discard their wedding rings. That the church should lose significant numbers of converts by insisting on a requirement of this nature can only be termed a tragedy.

The answer normally given to the foregoing statement is that persons should be willing to make a full surrender to God — that they are not making that surrender as long as they insist on holding to any “sin” whatever. If they will not make the commitment to God and the church because of a wedding ring, it is said, they are not truly and fully converted; the church has a right to ask that total surrender to Christ.

But it happens that many who turn away because of the wedding ring requirement *are* willing to make a full surrender — on every point that can be shown to have substantial biblical support. They *are* eager to do God's will in all respects — as long as that will can be clearly established. But they are not convinced that

God's will has been so established in the Scriptures. If they knew that Mrs. White permitted wearing of wedding rings in some countries because of the customs of those countries, they would be even less persuaded.

At least some potential church members know that Abraham's servant, acting in a mission directed by the Lord, gave jewelry to Rebekah when she was approached concerning marriage to Isaac (Genesis 24:22, 53). They know that in Christ's parable of the prodigal son the father, welcoming his long-lost son, told the servants to "put a ring on his hand" (Luke 15:22).

As for Paul's exhortation on modest attire (1 Timothy 2:9), potential church members reason that Paul was not making a flat prohibition but was only reminding women that, in the eyes of God, what counts is one's inner character, not the outer adornment. This is the meat of the message, they believe. Although Paul observed that neither jewelry nor "broided hair" is a substitute for character and good works, questioners are aware that Adventist women do indeed try to make their hair attractive — without feeling guilty.

Since the church insists that all relevant verses pertaining to a given question be studied before a final judgment is rendered, many women are quite honestly unconvinced that a wedding ring is evil. Are they to be condemned for this? They know, moreover, that they are not wearing that ring in order to make a display before others. For a married woman *not* to wear a wedding ring attracts far more attention than to wear it.

Finally, the emphasis against wedding rings doubtless strikes many sincere and intelligent women as petty and trivial, diverting attention from the major and solid truths of the church. They do not understand how the church can make such an issue out of something so far removed from the great truths of Scripture and of the church.

In my opinion, the church rightly interprets the New Testament as calling on men and women alike to dress with simplicity and economy. In a world where hundreds of millions lack bread, shelter, and medical care — to say nothing of the great lack of the gospel — it is impossible to justify either lavish or liberal expenditures on one's person and in one's home. Christians should be the first to recognize that the needs of others should be met before their own needless satisfactions are provided for. And by that I mean a more modest standard of living than most Adventists, especially the more well-to-do, are willing to accept.

Paul, in order to get on with the main business of the church, was eager to avoid unnecessary and divisive church rules. In the America of today, his attitude toward wedding rings would surely be: "If there be contention, we have no such rule."

1/ Ellen G. White, *Testimonies to Ministers and Gospel Workers* (Mountain View, California: Pacific Press Publishing Association 1923), p. 181.

## THE KNOWLEDGE OF FAITH

*Three discussion papers* responding to the paper presented by

RICHARD RICE

at the Seventh-day Adventist West Coast Religion Teachers Conference  
held at Loma Linda, California, May 3 to 5, 1974  
and published in SPECTRUM 5 (2) :19-32 (Spring 1973).

77

## Perspective and Tension with Faith and Reason

LARRY M. LEWIS

### I

When a person does theological reflection, he seems inevitably to come up against concepts such as God, grace, guilt, sin, redemption, atonement, church, sacraments. Man has always sought to find meaning in his universe; so he will probably try to organize these concepts in some way. He may appeal to reason as the primary (even the only valid) organizing method. Or he may appeal to experience, revelation, or a combination of methods. But whatever the method, the result is a religious philosophy that is unique to him and that can be understood only from within his phenomenological world.

But if we use the same method, why do we come up with results unique to us? Apparently we each come to religious concepts with a perspective that is prior to our organizational method and that strongly influences the final results. For this reason, I wish to support the position taken by Rice that man comes to religion with a faith perspective that is prior to reason. Moreover, I believe that such a

position has significant implications for Christianity. I will discuss briefly three of these implications.

1. Man has both a cognitive and an affective domain. If religion is to be properly understood, it must be seen as touching the whole of man, including both domains. Fifty years ago William James, on the occasion of his giving the Gifford lectures in England, said that in religion, as in other human endeavors, feelings tend to be more important than thoughts. I have not yet seen any data that would disprove this thesis. I would suggest that the irreducible core of faith has more to do with the affective state than with the cognitive. I am not sure Rice would agree with this; however, two of his illustrations of immediate knowledge (recognizing pain and loving a woman) are not primarily cognitive.

It is significant that the Deuteronomic rule of the religious life, as well as the first of the two great commandments, is to "love the Lord thy God with all thine heart, and with all thy soul, and with all thy might." A religion so narrowly conceived that it does not recognize and encourage the affective side of man's nature is in danger of concretizing symbols and statutes and propositions and ceremonies — and making them, rather than the experiencing of the love of God, into sacred things and sacred activities.

2. An understanding of the faith perspective we bring to religion can help us understand why two reasonable men can differ radically, and with conviction, about religion. To put reasoning at the base of religious faith forces us to conclude that when men disagree on a religious topic it is because one or the other has approached it with faulty reasoning and therefore is wrong. In fact both may have a secure relationship with God but simply begin with different faith perspectives.

3. This position also has important implications for an understanding of the work of the Holy Spirit. We have not been very successful in the past in explaining at what level the Holy Spirit functions. If there is a core perspective that is prerational and not of our own creation, then we can begin to understand the importance of choosing to let the Spirit come into our lives and transform this level of our being.

## II

I wish to mention three areas of concern that I have over Rice's position.

First, Rice defines reason as the capacity for giving reasons. He illustrates this by saying that the ability to reason is similar to a person's understanding why a car runs in contrast to the person who knows that a car runs but does not know why. Does he mean that I cannot reason about a topic unless I fully understand it? What if the topic itself is reasonable, that is, capable of rational explanation, but my understanding is limited? Take, for instance, the topic of the expanding



universe. Can only an astronomer reason about it? Is there any astronomer who fully understands it? For that matter, is there any topic which is so well understood that it can be reasoned about by use of the narrow definition that Rice has given? A definition that is too narrow has little value in religious discussion.

My second concern has to do with Rice's treatment of immediate knowledge. I concur that we come to religious concerns with a perspective that is self-authenticating, prerational, and that may seem to be immediate. But knowledge that seems to be immediate at one moment may be revealed to be mediate knowledge at a later time.

For instance, through the years I have noticed that I have a definite preference for brown shoes. I cannot explain why. I just like brown shoes. My preference for brown seems to be immediate and self-authenticating. However, I suspect there are, in fact, reasons why I prefer brown; and if I could spend sufficient time with an analyst, I might come to understand my bias toward brown. If I should, then I would come to understand what has seemed to be immediate knowledge.

In counseling, we often see people gain insights into why they have certain perspectives about life. As this process of self-discovery goes on, they may choose to retain or reject these perspectives. Their reasoning process now becomes important — for not only does reasoning test the validity of the original perspective, but it determines the influence the perspective will have in the future.

In the realm of religious values, this tension between faith and reason is especially essential. What we think is an irreducible element of faith may be only the result of childhood conditioning or peer pressure. There will always be a gap between that for which reason can provide a basis and that for which faith believes. But we should be seeking constantly to close the gap between the two.

Finally, I question the use of the phrase "maximal conviction" in relation to a faith perspective. It is true that a prerational bias is often held with tenacity. But is the term maximal conviction appropriately applied to a perspective that may be the result of childhood conditioning rather than divine revelation? Would it not be better to say that a faith commitment is held with maximal conviction when it has been verified through the process of reasoning to be fully consistent with all that is known about God?

When faith seeks and finds understanding, man can then know with certainty what was once known only in faith, for it now carries with it both the conviction of the original perspective and the authentication of reason as well. An over-emphasis on either the power of reason or self-authenticating knowledge can lead to delusion. Is it not important, then, to seek an appropriate tension between the realms of faith and reason to bring maximum conviction to our religious commitment?

# Reason and Will in the Experience of Faith

DALTON D. BALDWIN

80

We are truly fortunate to have Richard Rice's carefully reasoned paper as a basis for a discussion of the relation of faith and reason. The subject has needed critical scrutiny for some time. The urgency of the need for an analysis of this issue has increased with the study of such issues by Seventh-day Adventist scholars. We must be careful to avoid (*a*) intellectualism that might undermine the great verities of the faith and (*b*) unresponsiveness to the spirit of truth.

First, I will list a number of Rice's concepts which, in my mind, advance the discussion. Then I will state what I understand his paper to say. This approach should give an opportunity for correction and supplementation that may clarify the full intent of the paper. It is to be hoped that a set of commonly held concepts emerging from the discussion may become a basis for resolving differences where they exist.

## I

When Erasmus emphasized the importance of the action of free will guided by a scholarly treatment of the available evidence, Luther objected that such a role for the will was a legalistic rejection of righteousness by faith alone.<sup>1</sup> Rice also warns against a use of will which might exclude righteousness by faith. Regarding faith he asks, "Does it originate in an act of the human will, in an exercise of human freedom? Or is it the result of divine activity, such as the influence of the Holy Spirit?" (p. 19). By means of a rhetorical question, he clearly conveys the idea that faith is not a human work but a gift of God. I agree that we must not describe the role of the will in such a way that we claim it is able to generate faith.

Rice is in the Lutheran tradition when he emphasizes the damaged character of reason after sin. He speaks of the "disastrous effects of sin on man's rational

faculties" (p. 20). Any solution of the problem of the relation between faith and reason must take into account the distorted character of all human reason in a world of sin.

The transition from unfaith to faith is not produced by an action of reason. "There is no rational explanation for the transition from unfaith to faith; it can only be described" (p. 27). Rice explains the inability of reason to account for this transition by saying, "Faith always believes more than what reason can account for; what faith affirms always extends beyond the evidence which reason supplies" (p. 25). Reason is able to produce only greater or lesser probability for a concept and is not able to produce absolute certainty. I agree that carefully reasoned weighing of evidence is not able to produce certainty of knowledge and that the transition to faith is not produced by reason. I would say that the transition to faith is produced by God when man accepts this gift of faith.

81

All inferential reason is based on a prior immediate starting point. Rice differentiates between mediate knowledge (which is inferred from something else that is known) and immediate knowledge (for which no reasons can be given) (pp. 21-22). I agree that all attempts to give reasons for a position begin with a self-evident starting point.

God takes the initiative in all knowledge of faith. Rice approves of Augustine's position that "human reason can know nothing of the divine unless inwardly moved by the Spirit of God" (p. 20). I would go even further and say that man cannot generate any truth independently of God. "Every gleam of thought, every flash of the intellect, is from the Light of the world."<sup>2</sup> If man knows the truth about anything, that truth has not been generated by human reason apart from God.

There is a difference between belief in which there is a "mere entertainment of certain ideas" and faith in which there is "commitment to the content of these ideas as determinative of one's entire existence" (p. 20). When there is commitment, there is a modification of one's ability to be immediately aware of evidence from which inferences may be made (pp. 23, 25). I agree that the type of faith commitment a person makes has a far-reaching effect on his ability to be aware of evidence and to weigh its value.

## II

At this point, I turn from agreements to some questions that need consideration. Because these questions are related to the positions on which we agree, they are the basis on which to develop common answers.

The first question has to do with the role of free will. Although I recognize that there is value in rejecting the idea that the will produces faith, I believe that free

will should have a role in accepting or rejecting faith. The power is God's and the responsibility for acceptance or rejection is man's. Luther is wrong when he likens the will to a horse which "goes where God wills" when God rides it but sins when Satan rides it — with the self having no control over who rides.<sup>3</sup> Before God irresistibly grants grace, the will is in bondage to Satan. This makes God responsible for the rejection of faith, which is sin. Erasmus is wrong when he seems to say that part of the work is done by the unaided human will, and most of the work is done by the grace of God.<sup>4</sup> Rice is not clear in his treatment of freedom. *Is he able to demonstrate that faith is given by God in such a way that its acceptance or rejection is the responsibility of man?*

82

The second question deals with the extent of damage to man's cognitive powers resulting from sin. Rice makes a contribution to the solution of the problem of the relation of faith and reason when he points out that inferential reason is damaged. When he says, "To be seen as evidence, the facts always depend on the assumption of a particular perspective" (p. 23), he suggests that the quality of immediate awareness is improved after faith. If a person were to use his freedom to reject a right perspective, would not his subsequent immediate awareness be damaged? If my ancestors rejected truths, would they not hand on to me a distorted cognitive structure that would issue in faulty immediate awareness? Londis calls attention to the Moslem who experiences immediate awareness that has the same "self-authenticating" character as that of the Christian (p. 33).<sup>5</sup> I believe that the damage to reason corrupts both inferential reason and immediate awareness. *How can Rice identify and correct delusive and erroneous immediate awareness?*

The third question is related to our agreement that reason does not produce the transition from unfaith to faith. Rice says that the "very essence of faith, then, is maximal conviction" (p. 29). He explains the inability of reason to produce this maximal conviction by showing that the conviction is stronger than the available evidence supports. It seems to me that he is in danger of equating faith with the content of maximal conviction in such a way that he would not be able to revise the content of an immediate awareness if inferential reason seemed to make this necessary. When John the Baptist witnessed to his faith by pointing out Jesus as the Messiah, he meant a messiah who would conquer the Romans. Early Christian disciples revised the content of their faith commitment in the light of an inference from sense-perceived evidence when Jesus was crucified and did not conquer the Romans. Early Adventists revised the content of their faith commitment on the basis of inferences from sense-perceived consequences when Christ did not come on October 22, 1844. *Does Rice's position allow the correction of a faulty maximal conviction in the light of inferential reason?*

The fourth question deals, again, with the relation of immediate and mediate

awareness. We agree that all inferential reason is based on a prior immediate starting point. Rice seems to suggest that correct starting points identify themselves by being “self-authenticating” (pp. 20-21, 27). He even speaks of them as being “absolutely certain” (p. 29). I have spoken of the need to revise a maximal conviction in the light of inferential reason. It seems to me that the Bible does not recommend that revelation be identified as a certain type of immediate awareness. Not every concept for which there is maximal conviction should be accepted as revelation. It is necessary to test the contents of immediate awareness by comparison with other concepts believed to be revealed. (See 1 Corinthians 14:29-32, 1 Thessalonians 5:19-21, 1 John 4:1.) Both the testing of agreement with other revelation and the checking of fruits require inferential reason. *How does Rice identify revelation if immediate awareness always has priority over inferential reason?*

83

The fifth question concerns the relation between maximal conviction and faith. In one place Rice speaks about the difference between belief and commitment in a way that would permit a demon to be absolutely certain that God exists, but to be without faith (p. 20). In most of the paper he seems to say that if maximal conviction is present, faith is present (pp. 21, 27, 29-30). I believe that a person cannot be responsible for his commitment unless he is conscious of the alternative that is supported by the weight of evidence prior to his decision. For me, faith is not necessarily present when there is maximal conviction. Faith is present if the person commits himself in action on all truths that are clearly supported by the weight of evidence. The commitment is the way by which a person receives the gift of faith from God. *Should we equate faith with maximal conviction in the light of the suggestion of James that the demons have maximal conviction?*

These comments and questions seek to call attention to two important requirements for a description of faith. There must be an action of free will in receiving the gift of faith, so that God will not be responsible for evil in the case of rejection. Through the action of reason — comparing with other revelation and evaluating the fruits or consequences — it must be possible to correct errors that are held in faith.

#### REFERENCES

1/ Martin Luther, *On the Bondage of the Will*, Library of Christian Classics, 26 vols. (Philadelphia: The Westminster Press 1969), vol. 17, pp. 113-117.

2/ Ellen G. White, *Education* (Mountain View, California: Pacific Press Publishing Association 1903), p. 14.

3/ Luther, vol. 17, p. 140.

4/ Desiderius Erasmus, *On the Freedom of the Will*, Library of Christian Classics, vol. 17, pp. 79, 82, 84.

5/ James J. Londis, Comment on Rice, *SPECTRUM* 5(2):32-37 (Spring 1973).

# The Gift of Reason and the Aid of Revelation

ERIC D. SYME

84

Whether "reason" or "faith" takes priority in the conversion of a Christian requires definition of both terms and analysis of both in their relationship to "revelation." Rice asks: How does man come to show faith in God? Is his decision an extension of reason? Or is his decision independent from, and prior to, reason? Rice decides for the latter — stressing what he calls the basic tension between reason and faith, because reason cannot enable a man to understand God.

I believe that Rice develops a nonexistent problem — because, in his desire to narrow his field of consideration, he discusses reason and faith independently of revelation. But God's revelation of himself appeals to reason also, whether it be through nature, conscience, or inspired prophecy. Human reason, guided by the Holy Spirit, understands this revelation; faith then acts on it, because God, to some degree, is now realized and understood. Faith in any degree is essentially trust, and trust is based on understanding.

Further developing his theme, Rice stresses the difference between Augustine's emphasis that we must believe in order to understand and Thomas Aquinas's desire to build faith on reason. It is true that this difference of emphasis is a continuing theme in Christian history (nowhere more so than in the controversial period that followed Aquinas's great work); but it is necessary to remember that the tasks facing these two individuals were altogether different. Augustine wrestled with the inward problem of concupiscence and sought to provide the Latin church with a firm theology during the troubled early fifth century when the Roman empire was foundering. Aquinas endeavored to equate established church dogma with the new learning issuing from the Moslem and Grecian East. These scholars of the church must be viewed in relation to their times and circumstances.

Throughout the development of his paper, Rice emphasizes that we will see

truth in our own way because we order our facts differently and view them in different perspectives. Consequently, faith cannot build on reason. To demonstrate this view, he uses some strange illustrations that seem to work against him. Particularly is this the case when he compares a doctor's diagnosis to that of a person lacking the specialized knowledge that the physician enjoys. Actually, Rice is proving that the doctor comes to the right diagnosis because he puts the facts in the correct perspective. This hardly supports the position that we can all have different but justifiable viewpoints. Here, there is a right view and a wrong view, and it is the business of sound reason to gain the correct information and so come to the right conclusion.

85

God reveals himself to man so that man might have the correct understanding on which to base his faith. This principle is illustrated by the statements of Paul in the first and second chapters of Romans, in which the Apostle to the Gentiles deals with the background of faith. Paul suggests that the Gentiles are guilty before God because they perverted in their own minds God's revelation of himself, both in nature and to their own consciences. They had evidence, but they did not use it.

Similarly, explaining the Jewish rejection of his messiahship, Jesus stated, "If they hear not Moses and the prophets, neither will they be persuaded, though one rose from the dead" (Luke 16:31). It was the Jewish rejection of evidence that condemned them. They should refuse any self-appointed messiah — but Moses and the prophets had provided them with adequate evidence that Jesus was the long-awaited One. This proper conclusion they should accept and their faith act on.

It is the role of reason to examine evidence. Consequently, reason acts first. As Rice says, our understanding of God is not complete. Our understanding of God will never be complete. "Now we see through a glass, darkly" (1 Corinthians 13:12). But we can understand enough to develop a rational foundation for our faith.

Obviously reason must operate first. Possession of reason makes man different from the animals. God has always wished man to serve him of his own free will. Therefore God works by persuasion rather than by compulsion. To persuade man to serve him, God appeals to man's reason. When man sees to even a small degree what God is really like, he trusts God — has faith in him.

We sometimes misunderstand the importance of reason, because we approach this quality from a Greek rather than the Hebrew or Christian standpoint. As Greek philosophy discarded earlier religious perspectives, there was no revelation of God to take the place of the earlier pagan ideas. Consequently, the Greeks approached reason from the standpoint that they must view all available facts ob-

jectively and think their way to truth. The Hebrew accepted this principle of objectivity in some things but added to it the concept of revelation. "The fear of the Lord," to the Hebrew, was "the beginning of knowledge" (Proverbs 1:7).

We do order our knowledge from this perspective, but it is a function of reason rather than of faith. This is precisely the point that Ellen White makes in the *Steps to Christ* quotation cited by Rice (p. 22). As he says, she is writing of the evidences of God's being and activity to confirm the faith of a believer. But when she states, "*God never asks us to believe, without giving us sufficient evidence upon which to base our faith*" (italics supplied), she infers that we should also build on these rational foundations at the very beginning. We may certainly draw from her words a conclusion that we might have justification for not believing if God had not provided these evidences.

86

Rice stresses that Christ counseled his disciples to have the faith of little children. Children, Rice emphasizes, are not strongly rational. His argument here is based on misuse of context. Christ does not advise a child's lack of reason. He is stressing, rather, the way reason operates in a small child. The child learns to trust and depend on his parents. This one lesson his reason will teach him. From his birth the child's parents have cared for and nurtured him. Our reason should bring us to the same conclusion about God. God created us and redeemed us. Our attitude to God, therefore, should be like that of a child to his parents. We must trust him and totally rely on him. But this trust comes from our appreciation of God. We learn this because of revelation operating on our reason.

Finally, Rice cites what he calls the evidence provided by the martyr. Here he is on truly dangerous ground. Study of martyrdom indicates that people will die for a variety of reasons. They have embarrassed magistrates who really did not wish to persecute them. Certainly they are not always justified, or even admirable, in their reasons for accepting martyrdom. Calvin martyred Michael Servetus for his denial of the Trinity. Did Servetus get his "absolute conviction" from the "immediacy of faith"? No!

Reason is the gift that God has given us to enable us to assess facts and make sound decisions. This is just as true in matters of religion as in all other concerns. The only real difference is that unaided reason cannot see or understand God. It requires a combination of revelation and reason to do that.



## *Scientist's Psalm*

WALTER R. HEARN

87

Praise the Lord, created thing!  
Let all space with praises ring!  
Space itself, Hosanna sing  
Unto God, Jehovah, King!

### I

Particles in smallest cracks,  
Known but by emulsion tracks:  
Let all mesons praise Messiah!  
Songs of praise mount ever higher!  
Alpha, beta, gamma rays:  
Join the chorus of His praise!  
Be you ultimate or not,  
All created, all begot.  
Parity's been overthrown —  
Something He had always known.  
Antimatter, fragments odd,  
Quantum jumps to praise our God.

### II

Now from unexplored domains  
Up to where the atom reigns;  
Forged from state once hyperdense,  
Praise your Maker, elements!

Atoms of increasing mass,  
Nuclei from solar gas,  
Orbital electrons twinning:  
Praise the God who set you spinning!  
Rare-earth metal, halogen,  
Amorphous glass or crystalline,  
Solid, liquid, vapor phase:  
Join in everlasting praise!

## III

Molecules from atoms made  
According to the plans He laid:  
Praise the God of Angstrom units!  
God of Abraham — and Kunitz!  
Carbon compounds by the score,  
Hundreds, thousands, millions more;  
Helical configuration  
Structured into God's creation.  
Proteins now and DNA,  
Intertwining overlay;  
Prototype of living cell:  
Praise the God of Israel!

## IV

Viruses and protozoa:  
Praise the faithful God of Noah!  
Coral on the ocean shelf:  
Praise the God of life itself!  
Mildew, mosses, redwood trees,  
Birds in air and fish in seas,  
Crawling cockroach, roaring lion:  
Praise Jehovah, God of Zion!

Now with man, a new dimension —  
 Culture, science, and invention;  
 Man who can subdue the earth:  
 Praise the God who gave you birth!

V

Earth we live on, merely one  
 Planet of a minor sun:  
 Join this entire galaxy,  
 Showing forth His majesty!  
 Beyond our own galactic rim,  
 Billions more are praising Him.  
 Ten to some gigantic power  
 Times the height of Babel's tower.  
 Past the range of telescope:  
 God of Faith and Love and Hope.  
 Praise Him every tongue and race!  
 Even those in outer space!

Selah

However far space does extend  
 From beginning unto end,  
 Praise the God who does transcend!  
 Every knee before him bend!  
 God of whom these words are penned:  
 Against Thee only have we sinned.  
 Almighty Author of creation:  
 Visit us with Thy salvation.

Reprinted from 1963 *His*, student magazine of  
 Inter-Varsity Christian Fellowship, by permission  
 of the author and the publishers.

# The Crucial Question

E. ROBERT REYNOLDS

90

Donald E. Hall's third article in the Thoughts-on-the-Scientific-Attitude series (The 23-Hour Day, SPECTRUM 3(4):39-51, Autumn 1971) was called "excellent" on the editor's page. Being curious, I naturally read it first. Hall presented some interesting facts, ideas, and thought-provoking conclusions. Just how conclusive they are, even to Hall, may be unfair to say. I was glad for knowledge of the facts presented but was unable to follow all the conclusions.

One conclusion concerned the age of the earth as revealed by the ring count of some corals, bivalves, cephalopods, and other marine life. The presentation of the facts does not give me a feeling of insecurity. Such facts, although they are outside my disciplines, are not outside my experience with God, whose word and messages I trust. I believe that God says things so simply that a child can understand his promises and statements without difficulty. Therefore, the basic issue raised by Hall's article, I believe, is one of authority. Whom shall we trust?

I do not intend to be polemical, yet I would like to present several quotations that bear on this article and give a balance to the subject, acting as a reminder to some persons and a means of clarity to others.

In the beginning God created the heavens and the earth. The earth was without form and void, and darkness was upon the face of the deep; and the Spirit of God was moving over the face of the waters [Genesis 1:1-2].

So God created . . . every living creature that moves, with which the waters swarm, according to their kinds. . . . And there was evening and there was morning, a fifth day [Genesis 1:21-22].

In six days the Lord made heaven and earth, the sea, and all that is in them, and rested the seventh day; therefore the Lord blessed the sabbath day and hallowed it [Exodus 20:11].

To the foregoing quotations from the Bible, which include reference to all life in the seas, I would add from Ellen G. White the following statements — which

different people may evaluate and interpret differently for whatever the verses may mean to them.

I was then carried back to the creation and was shown that the first week, in which God performed the work of creation in six days and rested on the seventh day, was just like every other week. The great God, in His days of creation and day of rest, measured off the first cycle as a sample for successive weeks till the close of time.<sup>1</sup>

When the Lord declares that He made the world in six days and rested on the seventh day, He means the day of twenty-four hours, which He has marked off by the rising and setting of the sun.<sup>2</sup>

But the infidel supposition that the events of the first week required seven vast, indefinite periods for their accomplishment strikes directly at the foundation of the Sabbath of the fourth commandment. It makes indefinite and obscure that which God has made very plain. It is the worst kind of infidelity; for with many who profess to believe the record of creation, it is infidelity in disguise. It charges God with commanding men to observe the week of seven literal days in commemoration of seven indefinite periods, which is unlike His dealings with mortals, and is an impeachment of his wisdom.

91

Infidel geologists claim that the world is very much older than the Bible record makes it. They reject the Bible record because of those things which are to them evidences from the earth itself that the world has existed tens of thousands of years. And many who profess to believe the Bible record are at a loss to account for wonderful things which are found in the earth, with the view that creation week was only seven literal days, and that the world is now only about six thousand years old.<sup>3</sup>

All true science is in harmony with His works; all true education leads to obedience to His government. Science opens new wonders to our view; she soars high, and explores new depths; but she brings nothing from her research that conflicts with divine revelation.<sup>4</sup>

Geologists claim to find evidence from the earth itself that it is very much older than the Mosaic record teaches. . . . But apart from Bible history, geology can prove nothing.<sup>5</sup>

There should be a settled belief in the divine authority of God's Holy Word. The Bible is not to be tested by men's ideas of science. Human knowledge is an unreliable guide. Skeptics who read the Bible for the sake of caviling, may, through an imperfect comprehension of either science or revelation, claim to find contradictions between them; but rightly understood, they are in perfect harmony. . . . All truth, whether in nature or in revelation, is consistent with itself in all its manifestations.<sup>6</sup>

To these quotations let me add that Jesus referred both to the creation of Adam and Eve and to Noah's day. He believed in those events. If we disbelieve them, then we conclude that Jesus is untrue and uninspired — which puts us outside the pale of Christianity.

Hall's use of number-squares as an illustration of counterexample is excellent. Likewise, I enjoyed his five options of response to the facts he presented.

Frankly, I am a young-earth creationist. Yet, although God states in his word that Creation occurred by divine fiat, the actual method is not described. Therefore, as Hall says in his appendix D, "as to how the Creator worked, I [too] am much less certain." Nevertheless, "for a variety of reasons," mostly theological and experiential, I believe that the earth's age, as men currently know the planet, is approximately "6,000 ± 100 years." It may be naive of me to rest my faith on

this belief, for I, like Hall, hope that if God ever explains Creation to me “I would not be offended, or express any bitterness that he had allowed me to misunderstand or that he had not done it all in the way I thought he should” (p. 50).

One may possibly see in Genesis 1:2, or in other passages, basis for believing that some kind of foundation material existed before the actual Creation week. Without making God a debtor to “pre-existing material,” such an earlier creation, with the earth left formless and void, might not contradict the Mosaic account in Genesis. But by the wording of the fourth commandment, such material would have to be inorganic, not organic. To be an “old-earth creationist” may be one thing; but to believe in a long earth-history apart from the creation of the human race on the sixth day is another. This persuasion is tantamount to implying a lapse of time between the fifth and sixth days of the Creation week or between parts of the sixth day itself. This stance is biblically unjustified.

The pros and cons of the discovery of growth rings in certain marine creatures is discussed by Hall under five options. I was glad to learn these facts. Their implication, however, instead of shaking my faith in God’s word, only drives me to a need for a better understanding of it. Like Jonah, perhaps I may make Creation and the Bible story more meaningful with a revision of my model without the acceptance of a shorter day.

I fail to see that a change of models for the Noachian Flood is indicated by a slowing of the earth’s rotation. The biblical view of the Deluge would give only two values, and since (as I understand the story and nature’s data) destruction did occur suddenly, fossil deposits would reveal the pre-Flood value. The fact that fossils show instead a continuous variation makes me feel that the model change needs to be of Creation rather than of the Flood. But instead of the requirement of more time, as Hall seems to suggest, how about a change of method — or, that is, an understanding of the method God used?

The alteration in understanding of the way God made our biosphere is not original with me, but the setting in which I learned it makes me think that it is not too widely known. So I put it forth as a possible model of Creation that appears to accord with the Bible record.

Adam and Eve were created as adults, as were the animals, birds, trees, and other forms of life. Therefore, it is also possible that shellfish, corals, and those forms of sea and water life that appear to reveal long and continuous development reaching into tens of thousands and millions of years were created as mature forms and that their seeming age cannot be tied to the rotation of the earth.

If God did create life on the earth in an adult or mature form, perhaps this would affect the accuracy of radioactive and other dating methods. Inorganic materials may well have been made so that such dating methods fail to give a true

picture. Likewise, the dating of organic matter by carbon 14 or amino acids may yield inaccurate data. (I admit that such information is outside my disciplines and that I cannot explain all the technical factors.)

The model of Creation that I have set forth may be inadequate to explain the facts. Nevertheless, it is time that Seventh-day Adventists stop trying to prove the unprovable. I do not mean to stop research, but instead to quit attempting to treat as a fact that can be proved that which is only a theory to many scientists and which must be accepted by faith. Not all theories of earth origins, theological or scientific, are subject to objective proof. Creation, like redemption, is based on faith. Corroboration of a model is fine, but it does not *prove* conclusively the truth of the model or of the theory.

93 It is true that a creationist and revelation-based stand on origins will close many educated minds to evangelism. Dogmatism regarding time factors, in the face of observed fact, will only intensify this response. It is here that Seventh-day Adventist ministers need to *know the facts*. If Adventist scientists will provide models that conform to revelation's demands (instead of trying to make revelation conform to observation's opinions), then ministers, when confronted by scientists who do not believe as they do, will at least be aware of the facts; and their logical, coherent explanation of their model will appeal to some. The presentation by Adventist scientists of carefully-thought-out models and the scientific facts available is both a duty and an opportunity. If consensus is not possible, let more than one model be provided, together with the pros and cons of each.

Thus the matter of suspended judgment arises. If one has the facts, but does not think any of the models adequate, and desires to suspend judgment on the interpretation of those facts, he should do so and be free to wait until he finds what he considers to be a more fitting model. But if suspended judgment means waiting for more facts so as to choose more intelligently between God's authority and man's interpretation of those facts — either the church's authority or science's word regarding the meaning of observed phenomena — then suspended judgment is dangerous. Herein lies the critical problem.

The Author and Source of all true revelation and of nature is the same — God. He will not contradict himself. He cannot. The full processes he uses to create nature are not revealed in revelation, but they do harmonize. I have found God and his messages to be dependable. I have proved God again and again, and I trust him. I believe the young-earth creation theory, not because it is what someone taught me, nor because it is what some say the church teaches, nor because I have found what is for me a satisfactory model that conforms with the known facts as I understand them — but because I *know* the Maker and believe him. For me, his word is reliable.

## REFERENCES

- 1/ Ellen G. White, *Spiritual Gifts*, 4 vols. (Washington, D. C.: Review and Herald Publishing Association 1945), vol. 3, p. 90.  
White, *Patriarchs and Prophets* (Mountain View, California: Pacific Press Publishing Association 1958), p. 111.  
White, *Spirit of Prophecy*, 4 vols. (Battle Creek, Michigan: Steam Press of the Seventh-day Adventist Publishing Association 1870), vol. 1, p. 85.  
2/ White, *Testimonies to Ministers* (Mountain View, California: Pacific Press Publishing Association 1962), p. 136.  
3/ White, *Spirit of Prophecy*, pp. 86-87. See also *Spiritual Gifts*, pp. 94-95.  
4/ White, *Patriarchs and Prophets*, p. 115.  
5/ White, *Patriarchs and Prophets*, p. 112. See also *Spirit of Prophecy*, p. 88; *Spiritual Gifts*, p. 93.  
6/ White, *Patriarchs and Prophets*, p. 114.

# Evidence or Conjecture?

RICHARD RIMMER

With mounting concern I have read Donald E. Hall's two 1971 articles (SPECTRUM, Summer and Autumn). "The 23-Hour Day" causes me to wonder whether he is trying to prove too much. Since I have not checked his sources, my comments are based on his report of them.

My first observation is that the phenomenon of one-per-day growth "rings" in marine life is perhaps only a coincidence, albeit a somewhat convincing one. I believe that this is an obscurantist position. Unless someone has observed a mollusk making a ring each day for an extended period, I think caution would be advisable.

Without a certainty that these creatures produce one ring per day as a general rule, are we justified in making conclusions such as Hall's? If "modern" marine animals (I presume he means present-day species) produce 360-370 rings per grand division (assumed to be a year), this means that some of them are making more than one ring per day. If some produce 360 per year, they are failing to make at least one per day; the ones who make 370 per year may have made less



than one per day at times and more than two per day at other times. As Hall states, this is similar to tree-ring growth, which is also erratic. Furthermore, ancient animals may have produced more rings per year than their modern counterparts because of some factor with which we are not familiar. If modern animals seem to have the ability to make more than one ring per day, why not prehistoric animals?

If we assume, for the sake of argument, that these creatures always produce about one ring per day and that tidal friction is slowing the earth's rotation, how can we be sure that this friction has always acted at a constant rate or that this is the only mechanism that could have slowed the earth's rotation? Such an assumption gives a conveniently small factor of drag if we are looking for a product of many millions of years as the age of the planet. But Hall calls it a "hypothesis" — which immediately places us on shaky ground.

95

According to the graph in Hall's FIGURE 2, the rate of change, as he points out, was not only inconstant, but seemed to have reversed itself at least once, during the Triassic period, if his "error bars" are correct. Would this be true if tidal drag were responsible for a continuous braking of the earth's rotation? And why would the days per synodic month (I presume the graph should have said "month" instead of "year") remain constant, if not reversed, for nearly 200 million years between the Pennsylvanian and Upper Cretaceous epochs?

This seeming halt of the change in days per synodic month might reflect, in a diluvialist model, the thinking of workers who believe that a rapid flood action extended only up through the Mesozoic deposits (although this would not explain the change before a flood).

One wonders also if sufficient sampling was involved in the research Hall cites. It would not take many "counterexamples" of variant counts in ancient specimens to refute the conjecture in his article. Speaking of counterexamples, is the relationship of the 23-hour-day scientist to the 6,000-years-ago creationist the same order of relationship as the squaring of 2 to Hall's proposition A? The elementary procedure of counting from one to four gives firm epistemological grounds for dismissing his proposition A. On the other hand, what may be coincidence is combined with an assumption built on a hypothesis; and on this basis we are asked to doubt what God seems to say in regard to Creation and its date.

Admittedly, no one can "prove" the exact age of the earth. But even if God did not see fit to give us the exact date of Creation, we have accounts, guidelines, and hints of God's methods of creation, together with continuous genealogies from Adam to Christ (though these are open to some study).

It is obvious that no one has yet produced coercive proof for an age of our earth greater than 6,000 years. We cannot measure forces that operated in ancient

times. I do not wish to be equivocal or to belabor the old argument of dual explanations, but we cannot settle these questions by assigning probabilities to either side. There will always be room for doubt. Ellen White stated: "If you refuse to believe until every shadow of uncertainty, and every possibility of doubt is removed, you will never believe."\* Christ posed the rhetorical question: "When the Son of man cometh, shall he find faith on the earth?" (Luke 18:8). A six-day Creation week is the heart of the Sabbath commandment. The 6,000-years-ago date for Creation is not as firmly settled by the Bible. But if language means anything at all, a Creation *week* tells me that God used forces we know little about at a rate which indicates it was a once-for-all event.

What we know as matter and energy are present through processes in which we have had no experience and cannot explain with certainty. Man is confined to one small area of the universe — with a life-span of a very small order and with senses limited by dirty air and narrow-band response. As he strives to know both the universe and the atom, his physical limitation prevents him from comprehending either of these with certainty. This inability to receive information — which Einstein defines in his special theory of relativity — also limits the accuracy of our observations.

The history of science records repeated and humbling examples of reevaluation of evidence and rejection of models. Such findings ought to make us cautious about premature judgment.

I do not deprecate the efforts of scientists to gather and organize information. But a summary statement on the topic would be: "The evidence is not all in yet." As Hall suggests, I expect that God will have to provide the final evidence, and I am willing to wait until then.

Occasionally scientist contributors to SPECTRUM have expressed a desire for the Bible to have information value, but they seem to have decided in advance what information it will give. Such circular (and unproductive) thinking and methods of study are not in the mainstream of the search for truth.

\*/ Ellen G. White, *Testimonies for the Church*, 9 vols. (Mountain View, California: Pacific Press Publishing Association 1882), vol. 5, pp. 68-69.

# E Pur Si Muove

DONALD E. HALL

97

I review with mixed feelings my writings of three years ago and the reactions they have generated. I will reply first to some technical points; then I will add a few comments on the basic differences of philosophy that are involved.

Rimmer suggests that one-per-day growth rings are “perhaps only a coincidence.” Yes, that is conceivable, and each person must exercise his scientific judgment on this point; my own smells a causal connection and tells me that the alternative would be a fantastically remarkable coincidence. “Unless someone has observed a mollusk making a ring each day” is a little too strongly worded to be scientifically realistic. The experiments of Pannella and MacClintock, which I discussed in appendix B, were specifically directed at meeting this objection and have (I feel) at the very least made a good start toward that end.

If an occurrence of 360-370 rings (instead of always precisely 365) were of completely mysterious origin, Rimmer’s objection would be more justified. But there are perfectly reasonable explanations why there ought to be deviations. Unusual thermal conditions ought to produce occasional extra or missing rings *in understandable ways*. There is not just an *arbitrary* “ability to make more than one ring per day” in modern animals; it happens for good external reasons, and for the same reasons there should be variability (quite possibly a comparable amount) in prehistoric animals as well. I find it difficult to imagine “some factor with which we are not familiar” that would increase the average figures by the proper amount. If one postulates, say, frequent severe storms as a disturbing influence causing thirty or forty double-ring formations in a year, that should also increase the variability more than is apparent. Or if the extra rings are to result from something intrinsic in the animal, I can imagine entrained growth mechanisms giving either one or two rings per day, but not 1.1.

Rimmer asks, “How can we be sure that this friction has always acted at a constant rate?” We cannot be sure, of course; but we *can* see whether this hypothesis deserves to be called reasonable — by testing its consequences and by comparing

those of alternative hypotheses. And, as I pointed out at the bottom of page 41 [SPECTRUM, Autumn 1971], this hypothesis is remarkably fruitful. In fact, the rate almost certainly has *not* been strictly constant (see my appendix C); but the point is that the present rate is probably not far from a typical *order-of-magnitude* value. The label on FIGURE 2 should indeed have been "days per month."\*

As for "sufficient sampling," it is highly desirable to gather more evidence, and if "counterexamples" occur, fine. Meantime, it is *not* just an idle mathematical game to apply conservative statistical tests of significance to the best of our ability.

I agree in a technical sense that there is no "coercive proof" for an age over 6,000 years. But, then, truly coercive proofs do not exist outside the abstractions of pure mathematics. In even the physical sciences, "persuasive proof" is about as good as we can ever do; so that is all I am attempting to suggest.

98

I must disagree with the claim that "we cannot measure forces that operated in ancient times." The way in which we measure them will not be the convenient (and conceptually transparent) one of bringing them into our laboratory and balancing them directly against known standard forces. Yet any creative physicist could easily rattle off half a dozen ways of inferring the strength of some force that acted long ago (not any and every such force, but certain ones that left long-lived results) in an amazing variety of situations. And I will hold this point against any attempt at distinction between "infer" and "measure," for even the most direct of measurements still involves inference.

I agree on the necessity to avoid premature judgment — as long as it is applied to both sides in the debate. I have tried to suggest that acceptance of traditional interpretations of certain Scriptures without paying attention to physical evidence also constitutes premature judgment. Here, I am agreeing with Reynolds that the crucial question is one of authority. It is probably clear to many readers by now that I am highly skeptical of *any* purported authority that is presented as final, infallible, not subject to searching thought and testing against all other available evidence.

I have frankly grown quite weary of pushing that hoary old dodge, the "doctrine of apparent age," to ever greater lengths. Its credibility for me lies mainly within the area of things that "could hardly have been otherwise" — a full-grown Adam, a newly created oak that is thirty feet tall and never was an acorn. Whether Adam had an umbilicus, or the oak tree rings, would be borderline questions. But for God to measure out carefully just those amounts of various isotopes that would make a certain mineral sample appear to be a billion years old *when this has nothing to do* (so far as I can imagine) *with its essential role* of being a rock, smacks of his conspiring to mislead us. And what kind of warped mind do we attribute to God if we credit him with creating certain shells with 400 ridges,

others with 380, etc., when they could all just as well have had 365? Why do this in a context where our most reasonable interpretation would be that the animals experienced 400 days in a year, if such a year never existed? If anyone can imagine any good purpose in such a plan, I would like to hear it.

To the suggestion that Adventist ministers ought to know better the real pros and cons of various models, I can only add a resounding "Amen!"

Finally, I will agree with Reynolds that "suspended judgment is dangerous," although he and I do not thereby imply the same consequences. In my article I made a strong pitch for suspended judgment. This represented a definite stage in my personal struggle with these problems, and I still think it is an important and valid concept.

But also I have become concerned that suspended judgment not be a cover-up for avoiding a decision whose time has come. It can be a cop-out to say, "The evidence is not all in," if this is an excuse for holding onto a pet idea that the accumulating evidence seems more and more to refute. We will never have *all* the evidence; so we must weigh our caution (suspended judgment) against the need to go ahead with at least a tentative decision when the evidence becomes *sufficient* to support one, even though it is not complete.

Unfortunately, I do not think we have a clear choice "between God's authority and man's interpretation of those [scientific] facts." If we did, we could just choose God's side and count on being right; the suspended judgment would be applied only to the other side and would tend not only to be permanently suspended, but to become a total disinterest in those facts, even an ignorance of them. However, the real choice is between *man's interpretations* of God's authority and of other facts, and I insist that the interpretations are as needful of searching scrutiny on the one side as on the other.

\*/ The substitution of the word *year* for *month* was an editorial office inadvertence, not an error by the author. EDITOR.

## REVIEWS

# Psychotherapy and Possession

HARRISON S. EVANS

SYBIL

By Flora Rheta Schreiber

Chicago: Henry Regnery Company 1973 359 pp \$8.95

100

This is a popularly written account of the treatment of a patient suffering from a disorder commonly known as *multiple personality* — a clinical problem that psychiatry considers to be a hysterical neurosis, dissociative type. This disorder is best known to the public through such works as *Dr. Jekyll and Mr. Hyde* (Robert Louis Stevenson) and *The Three Faces of Eve* (C. H. Thigpen and H. M. Cleckley). What is unusual and noteworthy about the case of Sybil is the number of personalities involved — sixteen in all!

That several personalities (separate identities or egos) can exist in one person points up the complexity of the human mind and its extraordinary capacity to organize and fragmentize experience. "Unconscious," or "automatic," activity is known in some degree to nearly everyone, as it is manifested in the carrying out of certain acts with a minimum of attention or even no conscious attention. Normally, however, the ego is "in touch" with all ongoing behavior and, when it becomes necessary, can intervene to make corrections. In contrast, in the person with a multiple personality there are behavior patterns that have been able to achieve their own organizational and motivational system separate from the individual's central personality or ego, and these "alternate" personalities or egos can "take over" and direct behavior unbeknown to the individual's central personality or ego. Hence the term multiple personality.

It seems that the purpose behind the development of alternate personalities is to protect the individual's basic personality or ego from pain and anxiety. As a rule, the central ego is able to do this through a variety of coping devices called ego defenses. But in some individuals who have been subjected to extraordinary conflict in the developmental years, other coping devices may be needed, as seen in multiple personality. It was through her alternate personalities that Sybil dealt with certain deep feelings and needs. In so doing, she herself was unaware of her behavior and thereby avoided the precipitation of conflict and guilt.

The history of Sybil reveals that in childhood she was subjected to extremely painful experiences because of a sadistic and psychotic mother and an indifferent father who failed to protect her from her mother. Such experiences led to the development of alternate personalities that often assumed different names; some of these personalities, representing Sybil at

certain periods of her early life, were personalities that never developed. The author observes:

The selves, the doctor was now convinced, were not conflicting parts of the total self, struggling for identity, but rather defenses against the intolerable environment that had produced the childhood traumas. Sybil's mind and body were possessed by these others — not invading spirits, not dybuks from without, but proliferating parts of the original child [p. 233].

The original defenders, Peggy and Vicky, later produced progeny of their own. It was a very special family "tree," a genealogy of psychological functioning, emotional inheritance. By 1935, she who was known simply as Sybil and was then twelve had become all of the fourteen selves who had so far presented themselves in analysis [p. 256].

The treatment of such dissociative states requires the synthesis and integration of the different personalities into one. To accomplish this, one must "break down" resistances that have been erected by the ego against recognizing and accepting the dissociated personalities. The psychotherapist, Dr. Cornelia B. Wilbur, found it necessary to resort to the use of pentothal narcosynthesis to break through Sybil's ego defenses, for "only Sybil possessed none of the memories of the others" (p. 269). The medication served to make Sybil's ego less resistive and defensive and more responsive to Dr. Wilbur's integrative efforts. Gradually Sybil grew to remember not only what she had done as Sybil, but also what she had done as Mary, Sybil Ann, and all the others.

Through the treatment, Dr. Wilbur metamorphosed what had been fixations in the past into actual parts of the present. The hope was that this process would form the bedrock on which to erect the superstructure of *integration* — the means of restoring the original Sybil. After eleven years of work, Dr. Wilbur was finally able to record in her daily notes on Sybil's case, "All personalities one" (p. 338).

Sybil's attitude toward these selves, moreover, had completely changed, from initial denial to hostility to acceptance — even to love. Having learned to love these parts of herself, she had in effect replaced self-derogation with self-love. This replacement was an important measure of her integration and restoration [p. 337].

Anyone reading this book with a knowledge of Seventh-day Adventists would conclude that Sybil's family were members of the Adventist church. It would be easy to make the assumption that the religion was the cause of Sybil's illness. But this is not true. The real cause lay in the mother, who was an extremely ill person, and in the father, who provided so little support and protection. It is true, however, that the way certain beliefs of the church were presented could have contributed to Sybil's anxiety and could have provided the content of some of her fears. The lesson one should learn is that the church should offer a message of love and compassion, especially to children, and should minimize conflict, persecution, and dire future events. This would be the sign of both a healthy message and healthy parents who interpret it.

As one reads this fascinating but extremely complex story, one is impressed with several things. First, great damage can be done to personality when it is traumatized in childhood. Second, at great cost of time, effort, and devotion is such personality damage corrected (and some damaged personalities are irreparable). Last, Dr. Wilbur's patience, persistence, and unending devotion are deeply moving. The author suggests that Sybil's recovery was due as much to her love of and faith in Dr. Wilbur as to the techniques that were applied. This is probably true in all successful psychotherapy.

One final comment is in order. This case represents a modern-day example of "possession." It helps us better to understand this often misused and misunderstood word and to appreciate the anxiety, pain, conflict, and anguish that lie behind it. After Christ had exorcised the "demons" from the Gadarene, we are given a picture of a person who had become quiet, contented, and at peace. As a consequence of the "miracle" of her cure, Sybil presented a similar picture.

## Aspects of Science and Religion

RAY HEFFERLIN

### THE HUMAN QUEST

By Richard H. Bube

Waco, Texas: Word Books 1971 262 pp \$5.95

I dragged my feet on reading *The Human Quest*, because I had been turned off by the boisterous style of Richard Bube's frequent contributions to the *Journal of the American Scientific Affiliation*, and by the suspicion that this book would prove to be about social problems — which I do not enjoy *reading* about. As it turned out, Bube's style is rather subdued, and the discussion of "social implications" occupies only the tenth (last) chapter of the book.

Actually, the book is on the science-philosophy-religion interface, like *Issues in Science and Religion* by Ian G. Barbour (reviewed in Autumn 1969 SPECTRUM).<sup>1</sup> Both books present a concise history (Bube chapter two), devote several chapters to comparisons of the methods of science and religion (chapters three to five), deal with classical concepts of causation and classical proofs of the existence of God, explore inferences from quantum mechanics and cosmology, defend evolution (chapter nine), and are well organized. Both reject the "immortality of the soul" (pp. 146-149). Both espouse critical realism; both take pains to stress that there are no "uninterpreted facts" (pp. 57, 78, 140). Although Barbour did not conclude his book with a social problems chapter, later he did publish on the subject elsewhere.<sup>2</sup>

*The Human Quest* is very well written; it has good footnotes and an adequate index. Provocative questions follow each chapter and would be advantageous if the book were used in a Christian college or a state university classroom. Non-Christians would find only a couple of places objectionable.



One theme worth noting is the author's concept that understanding can and must take place at various levels. According to my limited knowledge, and according to the writer of the foreword, this is a *new contribution to epistemology*. For example, the sentence "I love you" can be exhaustively described as a specific combination of (a) alphabetical letters, (b) letter sounds, (c) words, or (d) grammar; it can be evaluated in terms of (e) the context in which it was said or (f) the ultimate content. The elements of levels, b, c, and d are produced by the combination or interaction of the elements of the levels "below."

This concept is the basis of the author's ontology (FIGURE 3, chapter seven). Reality is a series of levels: nonmaterial (energy, and  $E=mc^2$ ); nonliving material (particles, atoms, molecules, nonliving matter); simple life (cells); nonhuman living (plants, animals); human (man, society); and ultimate (God). The elements of any level except the highest one are produced by the combination or interaction of the elements of the levels below. This combination or interaction is opposed to the "vital force" (something from outside added to nonliving matter to make life) sort of explanation, but it is *not* simply reductive. What the author has in mind is a systems approach: elements of some of the lower level, when placed in correct relationship, produce something more in a higher level — something that is *not* an illusion. Bube uses this systems concept to dispose of popular notions that there is a distinct boundary between living and nonliving, between having a soul and not having a soul, between thinking and not thinking (cf. "Can computers think?"). This ontology is similar to that of Teilhard de Chardin's. (However, Bube judges Teilhard's Christian evolutionism destructive, because it gives mankind a false hope.)

103

A somewhat different aspect of the concept is illustrated by another clever example: the difference in understanding of *Gulliver's Travels* obtained by a child and by an adult sociologist. The child's understanding is just as correct as that of the sociologist's and just as necessary for a complete description of the book. Still another example: what is a cow? Only a Christian knows fully why the cow acts the way it does, because the Christian can add to correct bovine physiology and psychology the equally correct knowledge of God's purpose for the existence of the cow.

This aspect of Bube's dimensional epistemology seems to me to parallel the ancient concept that any event could be exhaustively described only when each of six causes was stated: (a) the efficient cause, which is the domain of science (the cow eats because its blood sugar is low, triggering certain muscular actions); (b) the teleological, future or final, cause (p. 119), which is recognized by Bube as valid (the cow eats to produce milk for mankind); (c) the vital cause, also recognized by the strongly theistic author (the cow's eating is a manifestation of the constant preserving power of God); (d) the formal or innate cause (cows just naturally eat); (e) the material or passive cause (the cow exists; it wouldn't eat if it didn't exist); (f) the cosmological or prime cause (the cow eats because of creation; i.e., if the universe had not been created the cow would not eat).

I have found this ancient concept *very* useful in analyzing arguments about bootlegging (prohibition was not the *only* cause), bird songs (territorial disputes are not the *only* reason), and highway deaths (poor railroad crossings are not the *only* explanation). On a grander scale it has helped in thinking about the causes of sin (there was no reason — *efficient* cause — for its existence) and the factors leading to Christ's death (deterrent, atonement for sin, example, anger of people at his life, etc.).

The author uses this second aspect of his dimensional epistemology to defend his theism (which allows for miracles) and to fight off behavioristic views of the nature of man. Bube agrees with Schaeffer<sup>3</sup> that behaviorism has helped to drive mankind over the line of despair into irrational types of belief (pp. 129, 135, 218). To counter it, Bube says that, though he may be a complex machine, man is not *only* a complex machine (pp. 134, 110-114, 151-152); conversion may be a psychological event, but it is not *only* a psychological event. He puts it this way: "Science has no *only*s."

In a third aspect of his many-level-description concept, Bube embraces the Copenhagen interpretation of quantum mechanics: the duality of waves and particles and the uncertainty principle are generalized into the principle of complementarity (chapter eight). The principle of complementarity is then applied by analogy to attack the problem of individual free will versus physical or social determinism, and the paradox of freedom versus God's foreknowledge.

The concept of description on many levels seems to be the book's major new theme as compared with Bube's earlier contributions in *The Encounter between Christianity and Science*<sup>4</sup> (reviewed in Spring 1972 SPECTRUM).

## II

The second theme of interest to SPECTRUM readers is inevitably the treatment of the history of the earth (chapter nine), since Bube is well known for his writing on behalf of special and general evolution.

The sins of earlier attackers of evolution are reviewed: failing to distinguish between microevolution, the general theory, and evolutionary philosophies; attributing the ills of the world to evolutionary thinking; focusing on a few contradictions instead of appreciating the overall picture; and, on the hint of a counterattack, retreating into versions of the Flood, with convenient miracles.

The *challenges* to evolution by more contemporary flood geology are dealt with summarily: evolutionists use circular reasoning; they do not allow for floods and other catastrophes; they have resurrected "spontaneous generation;" they ignore the second law of thermodynamics; and they still have no explanation for "missing links."

## III

For insight as to the basis for this strong position, note criticism of earlier traditional interpretation of the Bible to date Creation at *precisely* 4004 B.C. Read that hyperconservative Christians and non-Christian scientists both erroneously insist that the Bible be read literally. Recognize that Bube avoids such problems by interpreting the early chapters of Genesis to be a sequentially correct description of the exercise of God's power in the evolution of life forms here on earth. He pictures Genesis as a "prophecy of the past" in which numerical relationships are of uncertain interpretation and of no importance. Here he follows the strong current of thought among scientists-turned-writers (e.g., Reid, van der Ziel, etc.<sup>5</sup>).

*The Human Quest* eloquently defends Creation (pp. 192-208) but does not attach it to any specific time — not to 4004 B.C., not to the time when man first was given a soul, not to 4.5 billion years ago, not even to the time of the "big bang." This complete dissociation of Creation and the events studied by science is supported by the observation that God could have created at *any* time — say fifteen minutes ago — and we would never know the dif-

ference. Bube might even agree that some *part* of the universe might have been created a few minutes, or years, or millenniums ago, and we would never know the difference. Furthermore, science really doesn't *care*. It makes no difference to science if the universe or some part of it has been here for eons or if it just looks that way. (Seventh-day Adventists should not construe this in support of a recent, "mature" creation and flood (p. 189), because "physical data for a universal flood are simply not found.") Bube is shelving the Genesis record and the scientific studies of the origins of the earth on two different *levels*.

A mother tells her little girl about the "facts of life." Years later she tells the same girl, now a teenager, quite a different thing. The first explanation, which dealt primarily with two people liking each other very much, was just as necessary a part of the complete description of sex as was the second explanation. This is an analogy to the Genesis and science stories (pp. 122-123). Incidentally, the analogy presents Bube's case that technical data in a higher-level, value-oriented explanation are to be ignored (in this case, the baby is "in mama's tummy").<sup>6</sup>

One may inquire on what basis Bube accepts the Bible, if he dissociates what it says from specific data. Bube ignores technical data in the Bible only when the persons who wrote were not witnesses to the events (on-the-spot witnesses). When it comes to archaeology and history, he does not ignore the data. In fact, his Christian faith is based on (a) archaeological support of biblical-historical events and on (b) personal experience (p. 95). The events include the lives of the historical Jesus and of the Apostles (pp. 91-92, 120). Bube says, "If Jesus of Nazareth, called the Christ, did not rise from the dead at a particular time in history, at a particular place in history, the claims and promises of the Christian faith are worthless."

I wonder how Bube would react (cf. p. 121) to learning of Josiah Litch's prediction (based on numerical data in Revelation 9) that the Ottoman Empire would be humiliated in 1840.<sup>7</sup> I wonder how he would react to finding out about the rapidly improving scholarship associated with the Creation-Flood model, where both narrow and broad problems are being attacked with more and more sophisticated techniques.

Would such opportunities lead him to change his hermeneutics? Would they enable him to have *increased* confidence in the Bible? Would they open to him an even greater witness for the Christ?

#### REFERENCES AND NOTE

1/ Ian G. Barbour, *Issues in Science and Religion* (Englewood Cliffs, New Jersey: Prentice-Hall Incorporated 1966).

2/ Ian G. Barbour, An ecological ethic, *Christian Century* 87:1170 (October 1970).

3/ Francis A. Schaeffer, *Escape from Reason* (Downers Grove, Illinois: Inter-Varsity Press 1968).

Schaeffer, *The God Who Is There* (Downers Grove, Illinois: Inter-Varsity Press 1968).

4/ Richard H. Bube, *The Encounter between Christianity and Science* (Grand Rapids, Michigan: William B. Eerdmans Publishing Company 1968).

5/ James Reid, *God, the Atom, and the Universe* (Grand Rapids, Michigan: Zondervan Publishing House 1968).

Aldert van der Ziel, *Genesis and Scientific Inquiry* (Minneapolis: Denison Publishing Company 1965).

6/ I am indebted to Gerhard F. Hasel of Andrews University for a discussion on this point.

7/ Ellen G. White, *The Great Controversy* (Mountain View, California: Pacific Press Publishing Association 1950), pp. 334-335.

# THE PROPHET OF DESTINY?

*Three reviews of a book written for the general reader*

ELLEN G. WHITE: PROPHET OF DESTINY

By Rene Noorbergen

New Canaan, Connecticut: Keats Publishing, Inc., 1972 241 pp \$6.95

INGEMAR LINDÉN

106

One must understand from the beginning that *Prophet of Destiny*, like two books produced earlier by the same author, does not belong in the class of scientific treatment, something which the author nowhere insists on. With its easy style and light argument, this work on Ellen G. White is characteristic of the kind of journalism intended for sensational effect.

In the first chapter, "Psychics Versus Prophets," the author seeks to point out the difference between a prophet of Mrs. White's type and the visionaries and interpreters of signs that were contemporary to her time. For Adventists who know her life and writings, this is really unnecessary. In truth, one feels less than happy to have Ellen White compared with occult prophets and personalities. An orderly historical background on Millerism and Adventism would have added perspective.

Perhaps the publishing time schedule did not permit the use of a basic work such as *The Burned Over District* (Whitney Cross), in which there is a good explanation of the unusual religious movements that arose in upper New York state in the middle of the nineteenth century. Mormonism, Shakerism, and Millerism flourished side by side in this part of the United States, not to mention the new occult movement known as spiritism. There must be some explanation as to why these movements arose in this particular territory, although by no means do I insist that a true faith such as Adventism can be explained by contemporary categories of belief.

Noorbergen asserts that psychic and occult movements were the seedbed for Adventism, a new and interesting point of view that in part could explain William Miller's success. "While the uncommitted masses leaned heavily on the psychic predictions of Nostradamus (for the French), St. Odile (for the Germans), and those of St. Bearcan and Fionn Mac Cumhail Ceninit (for the Irish), Captain Miller's warning led to a religious awakening that was unequalled in American history" (p. 13). The last part of the quotation presents a fallacy. In absolute numbers, Miller's awakening was small compared with the massive movement led by Charles Grandison Finney. On the other hand, Millerism *was* the most inclusive *adventist* awakening of the premillennial movements, that is, of such as held that the Second Advent of Christ must precede the millennium.

The author's treatment of Mrs. White's biography lacks historical perspective and sound interpretation and use of sources. For example, it would be useful to know the place of visionaries in the radical left wing of Methodism. Furthermore, the entire section on early

Adventism after the disappointment in October 1844 is not clear, since the author did not take time to analyze the theological situation in Miller's unorganized left wing — the "shut-door" people who failed to accept the Albany conference program of preaching and evaluation of the events of October 1844. If the author had continued to read the letter from which he quotes (p. 20 ff.), he would have come straight into the "shut-door" debate and the strong vocal feelings it aroused in James and Ellen White after the disappointment. As these events are presented, the author can assert that such manifestations took place only in other groups (p. 31 ff.). In essence, Noorbergen shows us an Ellen White who never committed a single error — a treatment that does not differ from earlier judgments by the church organization.

This unawareness of historical context also appears in the section on religious psychology, where, for example, the author makes no reference to the Roman Catholic church, in which visionaries have been common since the Middle Ages. Nor are modern works on terminology consulted. The author is content with repeating personal reports by such as were present, creating the impression that the "bodily manifestations" seen in Mrs. White in vision were peculiar to her.

In the chapter most open to dispute, "Science Catches Up with a Prophet," the author presents aspects of Mrs. White's invaluable medical-dietary contribution, but without telling his readers how her views in essential parts were also those of health reformers whom she knew and whose works she had read after she had received the first principles of healthful living in her vision of June 6, 1865. Such a procedure is misleading and ethically questionable. It would have been more fortunate had the author used Dores Eugene Robinson's *Story of Our Health Message* (chapter eight) and learned that much of Mrs. White's advice on health had been stated by contemporary advocates of healthful living! Men like Sylvester Graham, Larkin B. Coles, and James C. Jackson had taken up the subject before she became the great advocate of healthful living. Such an acknowledgment would not remove an iota from her contribution, for she was both selective and creative in her health message. Both Adventists and millions of persons of other persuasions have been blessed by the counsel found in her writings.

The author discusses the relation between the use of flesh food and cancer, for example. The idea that there is a disastrous relation was stated back in the 1840s by Coles, to mention but one American health reformer. Today one should be aware of two facts. First, the origins of the disease have not yet been fully settled by science; hence categorical generalizations must be avoided in serious discussion. Second, cancer is known not to be derived exclusively from flesh foods. When science has advanced further, it will become clear how far statements by health reformers can be checked scientifically. What is already astonishing is how the sum of Mrs. White's teaching on healthful living has been supported by scientific research. Again and again the young science of health has upheld her and the advocates of healthful living.

In another section of the same chapter, the author discusses the mental and prenatal influence of the mother during pregnancy, as taught by Mrs. White and other health advocates. One should not react negatively to the fact that some of these advocates held such views before she did, for in the autumn of 1867 she explained what happened. Affirming that she had received the main principles of her health message from "above" before studying the works on the subject which she had in her home, Mrs. White was surprised to find

that the views of other health reformers agreed with those shown her in vision. Then she copied a good many statements that were sound. Noorbergen's presentation passes over all this in silence.

Another interesting observation in the author's chapter on medicine is the emphasis given Mrs. White's mention of electric currents in the brain and their importance in life functions. The author's subtitle, "Electricity — the Vital Force," reminds us at once of mesmerism but fails to inform us that most all health reformers emphasized the importance of electricity in brain functions. This fact in no wise lessens the importance of Mrs. White's handling of the subject in her works.

It should also be noted that a fairly large part of the work will not be understood by European readers, since it deals with conditions in the United States, especially the section on Sunday-keeping and Sunday laws. In his eagerness to show that the statements in *The Great Controversy* are in process of fulfillment, the author fails to present the overall picture of religious liberty that now obtains in the United States, where little impinges on the liberty of a seventh-day Sabbath observer to practice his faith. Religious liberty is more widespread in the United States than it is in any country in the world, with the possible exception of Sweden since its separation of church and state. (Of course, there is no absolute guarantee that this condition could not change quickly.)

*Prophet of Destiny* must be considered a link in the series of sensational books on the occult that Noorbergen has produced. One must regret the fact that the Lord's messenger has been delineated against this ghostlike background. The work may appeal to readers who have been captured by astrology, interpreters of signs, and all types of mystic messages from the spirit world. Perhaps a few readers will be induced to read the work as a better alternative than the literature of the occult. But what will be the gain? This road will not lead to the green fields of the gospel.

To the average Adventist reader, *Prophet of Destiny* will seem a sensational amputation of a sound prophet. In this volume there is little that portrays the orthodox, evangelical Ellen White. Here is where her strength lies. She herself was fascinated by Jesus of Nazareth and found rich wisdom and experience in his saving work and life.

What is called for is an honest, rational treatment of the genuine Ellen G. White, who had nothing in common with her contemporary visionaries and sign readers. Less sensational and more factual treatment would have resulted in a different picture of this woman who was the devoted disciple of Jesus the Christ. When may we expect such a treatment?

(Translation by William M. Landeen. EDITOR.)

#### NORVAL F. PEASE

Noorbergen's attempt to interpret Ellen White to the general public is a laudable venture. There are few criteria by which to evaluate an endeavor of this kind, because it has never been done before. Most readers will agree, however, that the author has mastered his subject well, that he has successfully projected an image of Ellen White as a gentle but very effective

prophetic voice, and that his style is readable. He avoids the pitfall of phony objectivity and puts his convictions on the line with clarity and decisiveness.

Although I appreciate Noorbergen's significant work, I would like to call attention to two areas in which . . . this book might have been strengthened. These suggestions are made humbly [in recognition of] the danger that every reviewer faces of becoming a "Monday morning quarterback."

First, Noorbergen almost completely overlooks Ellen White's leading theme — salvation through the grace of God and faith in Christ. (One exception to this generalization is found on pages 136-138.) Several of her books — notably *The Desire of Ages*, *Steps to Christ*, *Christ's Object Lessons*, and *Thoughts from the Mount of Blessing* — are largely devoted to this theme; yet the footnotes in Noorbergen's book do not include a single reference to any of these volumes. In the "tests of a true prophet" listed on pages 20-21 there is nothing specific about the gospel of salvation except a recognition of the incarnation of Jesus Christ. Some of us are deeply convinced that Mrs. White should be presented to the world not merely as a successful predictor of events, not merely as an advocate of healthful living, not merely as a foe of spiritism and a friend of the Sabbath, *but as one of the most convincing preachers of Christ and his gospel of all time.*

Second, it seems that Noorbergen has not always been wise in his selection of material. Obviously, and rightly, the author is endeavoring to present evidence that will convince the contemporary reader that Ellen White was a genuine prophet of God. The effectiveness of this effort at persuasion will depend in part on the ability of the reader to understand and accept the arguments put forth in the book. To belabor the point that rigorous persecution of Sabbath-keepers is just around the corner in America seems so incredible to the average reader that he might be led to reject the entire book. Also, the eighteenth- and nineteenth-century signs of the Second Coming of Jesus are not nearly as convincing as twentieth-century signs, of which there are plenty. The final chapter contains more than twenty-five pages of direct quotation from *The Great Controversy*, much of which is incomprehensible to the modern mind. The predictions regarding the San Francisco earthquake also seem to occupy more prominence than they deserve.

This is not to say that the author or Ellen White were incorrect in the areas listed above. Neither should we conclude that these subjects are unimportant. But in reaching people, every successful persuader begins with those things that are more easily understood and accepted. Some of us have hoped that the Noorbergen volume could be handed freely to our non-Adventist friends as a convincing presentation of an important tenet of the Adventist faith. In some respects the book is suited for this purpose. But some of the areas covered are likely to "turn off" the average reader before he really understands the issues.

This review should close on a positive note. Chapter four, "Science Catches Up with a Prophet," seems convincing and well-documented, although a more reliable evaluation should come from those trained in science and medicine. As a writer of biography, Noorbergen reveals great ability. His book will be valuable as enrichment reading for people who are already convinced that Ellen White had the prophetic gift. More important, the author has succeeded well in lifting Ellen White above the level of the ordinary psychic.

(Reprinted, with permission, from the June 27, 1972, issue of the Loma Linda *Pulse*. EDITOR.)

A journalist who has written *You Are Psychic*, David N. Bubar's story, and has coauthored with Jeane Dixon *My Life and Prophecies*, Noorbergen has not written a definitive biography of Ellen G. White. Instead, he has evaluated her prophetic career in the narrow sense of its relation to the occult world, both past and present. With an undisguised Seventh-day Adventist bias, Noorbergen disparages parapsychological phenomena in juxtaposition to biblical prophetism, in which he places Mrs. White (chapter one, "Psychics Versus Prophets"). Emphasizing the psychic aspect that Mrs. White herself underplayed, Noorbergen concludes that the "true prophet" is "someone who has no degree of freedom either in tuning in or controlling the prophetic impulses or prophetic recall." These impulses, he says, "are superimposed over the prophet's conscious mind by a supernatural personal being, having absolute knowledge of both past and future, making no allowance for error or human miscalculation" (p. 21). By assuming such an interpretative model, Noorbergen need not reckon with the cultural, social, political, or economic ambience of the prophet; he concentrates on the personal, moral, spiritual, and psychic. Thus his book fails as a *historical* biography.

The author devotes only a chapter to the biographical data of Mrs. White's nearly eighty-eight years (chapter two, "A Humble Life") — but, then, a chapter to the physical and psychic elements of her prophetic visions (chapter three, "The Enlightened Prophet"), and another chapter to her predictions on medicine, nutrition, hygiene, and ecology (chapter four, "Science Catches Up with a Prophet"). Noorbergen seems unaware that "health reform" in America was over a quarter of a century old by the time of her Otsego, Michigan, vision in 1863 and fails to recognize that Ellen White's eclectic facility must not be confused with originality. The fact that the prophetic comment on spiritualism (chapter five, "Unmasking the Mastermind") came after the spiritualists of 1870 numbered 11 million adepts in America must devalue Noorbergen's statement that "in her time it was a prophecy; yet today it is history" (p. 156). A similar point should be made on Mrs. White's concern with civil and religious intolerance (chapter six, "A Two-Pronged Controversy"), inasmuch as the 1880s were a peak period for American sabbatarianism and "blue-law" prejudice.

Although Ellen White's work was not derivative alone, it cannot be understood in isolation from late nineteenth-century concerns. The prophet cannot be understood apart from her people either. Noorbergen identifies her as a charismatic leader who (unlike the psychic) shapes, edifies, and counsels a community. Yet he does not explore Mrs. White's relationship to developing Seventh-day Adventism.

The author does provide a very readable glimpse into the mind of the Adventist prophet. But we are still awaiting a full-fledged biography of this inimitable woman.



## NOTES ON CONTRIBUTORS

ALAN P. DAVIES (*The Wafer*), an Atlantic Union College graduate living in Massachusetts, has contributed poems to 1971, 1972, and 1973 issues of *SPECTRUM*.

LAWRENCE T. GERATY (*The Genesis Genealogies As an Index of Time*) is assistant professor of Old Testament studies at Andrews University. Born in California, he grew up in China and Lebanon, where his parents served as missionaries. After graduation from Pacific Union College, he earned the master of arts and bachelor of divinity degrees from Andrews University (*magna cum laude*) and the doctor of philosophy from Harvard University. He was a Fulbright Fellow in the Middle East in 1970-71 and was director of the Andrews University Heshbon expedition in Jordan in 1974.

RICHARD M. RITLAND (*The Fossil Forests of the Yellowstone Region*) is professor of paleontology and geology at Andrews University. A graduate of Walla Walla College, he earned the master of science degree from Oregon State University and the doctor of philosophy in vertebrate morphology and paleontology from Harvard University. He is past director of the Geoscience Research Institute (based at Andrews University) and has led many field trips for investigating geological and paleontological phenomena in the United States and abroad.

STEPHEN L. RITLAND (coauthor, *The Fossil Forests of the Yellowstone Region*) has the bachelor of arts degree from Andrews University and the doctor of medicine from Loma Linda University. On numerous field trips to the Yellowstone fossil forests, he has participated in the investigation of the problems and unusual features of that area.

JAMES L. SPANGENBERG (*The Ordination of Women: Insights of a Social Scien-*

*tist*) lives in Westmoreland, New Hampshire, is professor and chairman of the home economics department at the Keene State College, a division of the University of New Hampshire, and teaches in the field of family and human development. He has the bachelor of arts degree from the University of Florida, the master of arts in sociology from the University of Michigan, and the doctor of philosophy from Pennsylvania State University in child development and family relations. He has been a campus minister at the University of Louisville and has served the World Council of Churches as consultant on the role of women in the church.

Responses are made in this issue to RICHARD RICE (*The Knowledge of Faith*), whose article appeared in the second issue of the 1973 *SPECTRUM* (pages 19-32). He has his doctor of philosophy degree from the University of Chicago and is instructor in religion at the Loma Linda University College of Arts and Sciences. The responses are by:

DALTON D. BALDWIN (*Reason and Will in the Experience of Faith*), who has the master of arts from Princeton University and is doctor of philosophy candidate at Claremont Graduate School, and who is associate professor of Christian theology at the Loma Linda University Division of Religion.

LARRY M. LEWIS (*Perspective and Tension with Faith and Reason*), who has the master of arts and bachelor of divinity degrees from Andrews University, and who is associate professor of theology at Walla Walla College (Washington).

ERIC D. SYME (*The Gift of Reason and the Aid of Revelation*), who has the doctor of philosophy degree from American University, and who is professor of religion and history at Pacific Union College (California).

WALTER R. HEARN (Scientist's Psalm) was associate professor of biochemistry at Iowa State University in Ames when he wrote this poem. He now lives in Berkeley, California, and is editor of the *American Scientific Affiliation Newsletter*.

Earlier SPECTRUM articles by DONALD E. HALL brought forth comments by two persons and a response by Hall as follows:

E. ROBERT REYNOLDS (comment: The Crucial Question), Seventh-day Adventist minister, missionary, educator; graduate of Loma Linda University College of Arts and Sciences, with master of arts and doctor of philosophy degrees from the University of Punjab (Pakistan); prematurely retired at Riverside, California, on returning from Pakistan after being shot by a night prowler.

RICHARD RIMMER (comment: Evidence or Conjecture?), scientist and teacher, Madison College, Tennessee.

DONALD E. HALL (response: E Pur Si Muove), doctor of philosophy from Stanford University; physics teacher at California State University at Sacramento.

HARRISON S. EVANS (Psychotherapy and Possession) reviews bestseller *Sybil* from his background as professor and chairman of the department of psychiatry at Loma Linda University School of Medicine and

formerly a member of the psychiatry faculty at Ohio State University medical school. He holds the doctor of medicine degree from Loma Linda University.

RAY HEFFERLIN (Aspects of Science and Religion) reviews Bube's book *The Human Quest*. He holds the doctor of philosophy degree from California Institute of Technology and is professor and chairman of the department of physics at Southern Missionary College (Tennessee).

Three reviews of Rene Noorbergen's book *Ellen G. White: Prophet of Destiny* (appearing together under the heading Prophet of Destiny?) are by the following:

INGEMAR LINDÉN (doctor of theology, Uppsala University, Sweden), docent at Uppsala University and also teacher at Ekebyholmsskolan at Rimbo, Sweden.

NORVAL F. PEASE (doctor of philosophy, Michigan State University), professor of applied theology at Loma Linda University College of Arts and Sciences.

JONATHAN M. BUTLER (doctor of philosophy candidate, University of Chicago), instructor in religion at Union College (Nebraska).

ROLAND CHURCHMAN (That Wedding Ring) is a pseudonym.

#### TO ANSWER QUESTIONS —

Nothing esoteric, erudite, or earthshaking should be drawn from or put into the four designs appearing on the 1973 SPECTRUM covers and again, in slightly modified form, on the 1974 covers. They are symbols that originated in folklore and were chosen to add interest to our sober cover and to say obliquely four good words that are full of years and rich in sentiment and philosophical overtones. These words are with us always, somewhere on the globe, whether we are ready or not, and whether they are costumed as lion, lamb, or other metaphor:

SPRING



SUMMER



AUTUMN



WINTER





