## Contents

Chapte	r Subject	Author	Page
	List of Tables		vii
	List of Figures		xi
	The RATE Group		xxiv
	Prologue	John D. Morris	xxv
	Acknowledgments		xxix
1	Introduction	Larry Vardiman	1
2	Young Helium Diffusion Age		
	of Zircons Supports Accelerated		
	Nuclear Decay	D. Russell Humphreys	25
3	Radiohalos in Granites:		
	Evidence for Accelerated		
	Nuclear Decay	Andrew A. Snelling	101
4	Fission Tracks in Zircons:		
	Evidence for Abundant		
	Nuclear Decay	Andrew A. Snelling	209
5	Do Radioisotope Clocks Need		
	Repair? Testing the Assumptions		
	of Isochron Dating Using K-Ar,		
	Rb-Sr, Sm-Nd, and Pb-Pb		
	Isotopes	Steven A. Austin	325

6	Isochron Discordances and the Role of Inheritance and Mixing		
	of Radioisotopes in the Mantle and Crust	Andrew A. Snelling	393
7	Accelerated Decay: Theoretical		
	Considerations	Eugene F. Chaffin	525
8	<sup>14</sup> C Evidence for a Recent Global		
	Flood and a Young Earth	John R. Baumgardner	587
9	Statistical Determination of		
	Genre in Biblical Hebrew:		
	Evidence for an Historical		
	Reading of Genesis 1:1-2:3	Steven W. Boyd	631
10	Summary of Evidence for a		
	Young Earth from the RATE		
	Project	Larry Vardiman	
		Steven A. Austin	
		John R. Baumgardner	
		Steven W. Boyd	
		Eugene F. Chaffin	
		Donald B. DeYoung	
		D. Russell Humphreys	
		Andrew A. Snelling	735
	Index		773

## **List of Tables**

Table	Title	Page
Introdu	action	
1	Results of high priority experiments	8
2	Results of additional significant experiments	9
3	Results of low priority experiments	11
Young 1	Helium Diffusion Age of Zircons	
Suppor	ts Accelerated Nuclear Decay	
1	Helium retentions in zircons from the Jemez granodiorite	29
2	Latest (2003) Jemez zircon diffusion data for about	
	1200 50-75 µm length zircon crystals from borehole GT-2	
	at a depth of 1490 m	45
3	New Creation model	51
4	Uniformitarian model	54
5	Helium diffusion age of zircons	56
6	Billion-year uniformitarian retentions versus	
	observed retentions	57
A1	U-Pb analyses of three zircons from the Jemez granodiorite	76
B1	Diffusion of He from biotite sample BT-1B	78
B2	Diffusion of He from biotite sample GT-2	80
C1	Diffusion data for zircon sample YK-511	82
Radioh	alos in Granites: Evidence for Accelerated	
Nuclear	r Decay	
1	Radiohalos recorded in Precambrian (pre-Flood)	
	granitic rocks	115
2	Radiohalos recorded in Paleozoic-Mesozoic (Flood)	
	granitic rocks	116

Table	Title	Page
3	Radiohalos recorded in Tertiary (post-Flood)	
	granitic rocks	118
4	Radiohalos recorded in regional metamorphic rocks	188
Fission	Tracks in Zircons: Evidence for Abundant	
Nuclear	Decay	
1	Details of the samples obtained for this study, including	
	locations, geological age designations and previously	
	published age determinations	218
2	Results of the zircon fission track dating of twelve tuff	
	samples from the Grand Canyon-Colorado Plateau region	238
3	The mineral composition of the <2-4 µm fraction of Muav	
	and Tapeats tuff samples MT-3 and TT-1 respectively	
	determined by XRD analyses	265
4	The U-Th-Pb radioisotope analyses and ages of abraded	
	zircon grains from Muay tuff sample MT-3 and Tapeats	
	tuff sample TT-1	271
Do Rad	ioisotope Clocks Need Repair? Testing the	
	otions of Isochron Dating Using K-Ar, Rb-Sr,	
	and Pb-Pb Isotopes	
1	Major-element oxide and selected trace element analyses	
_ ^	of the Beartooth andesitic amphibolite from the southeastern	1
	Beartooth Mountains, northwest Wyoming	346
2	Whole-rock, major-element oxide and selected trace element	
2	analyses of eleven samples from the Bass Rapids sill, Grand	
	Canyon, northern Arizona	351
3	K-Ar data for the whole rock and selected minerals from the	1807.75
3		
	Beartooth andesitic amphibolite, sample BT-1, northwestern	
	Wyoming	353
4	Whole-rock and mineral Rb-Sr, Sm-Nd and Pb-Pb	
	radioisotopic data for the Beartooth andesitic amphibolite,	
	sample BT-1, northwestern Wyoming	353

Table	Title	Page
5	K-Ar data for whole rocks from the Bass Rapids diabase	
	sill, Grand Canyon, northern Arizona	357
6	Whole-rock Rb-Sr, Sm-Nd and Pb-Pb radioisotopic data for	
	the Bass Rapids diabase sill, Grand Canyon,	
	northern Arizona	360
7	Mineral Rb-Sr, Sm-Nd and Pb-Pb radioisotopic data for	
	diabase sample DI-13 from the Bass Rapids sill,	
	Grand Canyon, northern Arizona	362
8	Mineral Rb-Sr, Sm-Nd and Pb-Pb radioisotopic data for	
	diabase sample DI-15 from the Bass Rapids sill, Grand	
	Canyon, northern Arizona	362
9	Magnetite and ilmenite Rb-Sr, Sm-Nd and Pb-Pb	
	radioisotopic data for the Bass Rapids diabase sill,	
	Grand Canyon, northern Arizona	363
Isochro	n Discordances and the Role of Inheritance and	
Mixing	of Radioisotopes in the Mantle and Crust	
1	K-Ar model and isochron "ages" obtained for the	
	targeted rock units	411
2	K-Ar, Rb-Sr, Sm-Nd and Pb-Pb isochron "ages" for the	457776
	targeted rock units	414
3	Sr-Nd-Pb isotope geochemistry data obtained for the	4.7614
	targeted rock units	422
Acceler	ated Decay: Theoretical Considerations	
1	Results of calculations for Oklo samples	539
2	Sensitivity of various forbidden β-decays to changes in	
	decay energy	566
3	Data on the ratios $R$ for each sample	570

Table	Title	Page
14C Evid	dence for a Recent Global Flood	
and a Y	oung Earth	
1	AMS measurements on samples conventionally deemed	
	older than 100 ka	596
2	Results of AMS 14C analysis of ten RATE coal samples	605
3	Detailed AMS 14C measurements for ten RATE coal	
	samples in pMC	608
4	AMS 14C results for six African diamonds	611
5	AMS 14C result for six alluvial diamonds from Namibia	612
6	AMS 14C results for the twelve diamonds with the	
	laboratory's standard background correction applied	614
Statistic	cal Determination of Genre in Biblical Hebrew:	
Evidence	e for an Historical Reading of Genesis 1:1-2:3	
1	Classification table (by passage)	668
B1	Finite verb counts for narrative: Torah	698
B2	Finite verb counts for narrative: Former Prophets	699
<b>B3</b>	Finite verb counts for narrative: Latter Prophets	699
<b>B4</b>	Finite verb counts for narrative: Writings	700
B5	Finite verb counts for poetry: Torah	700
B6	Finite verb counts for poetry: Former Prophets	701
<b>B</b> 7	Finite verb counts for poetry: Latter Prophets	701
B8	Finite verb counts for poetry: Writings	702
C1	Parameter estimation section	703
C2	Model summary section	703
D1	Retrospections on the past	705
D2	Origins of names and sayings	705
D3	Historical footnotes	706
D4	Sources cited	707
D5	Chronological reference points	708
D6	Function of genealogies	710
D7	Commemorative days and feasts	711
D8	Temporal continuity	712

## List of Figures

Figure	Title	Page
Young I	Helium Diffusion Age of Zircons	
Support	s Accelerated Nuclear Decay	
1	Zircons from the Jemez granodiorite	26
2	Nuclear decay makes He within zircons	27
3	Drilling rig at Fenton Hill, New Mexico	28
4	He atom moving through a crystal	32
5	Typical Arrhenius plot	35
6	Increasing number of defects slides the defect line upward	36
7	Interpretations of Russian zircon data compared with	
	Nevada zircon data	37
8	Observed diffusion coefficients in zircons	40
9	Observed diffusion coefficients in two types of mica	41
10	Scanning electron microscope photo of a zircon leached	
	in HF	42
11	Scanning electron microscope photo of a zircon from	
	size-selected sample 2003	43
12	Spherical approximation of the zircon-biotite system	47
13	The 2003 zircon data line up very well with the Creation	
	model, and resoundingly reject the uniformitarian model	55
14	New retention point confirms Gentry's retention data	59
15	Lines of Figure 13 redrawn in accordance with the	
	2003 data	60
16	Different temperatures cannot rescue the uniformitarian	
	model	62
17	Closure and re-opening of a zircon	64
18	Two hourglasses representing two methods of dating	
	zircons	66
19	Particle motion in curved space	71

Figure	Title	Page
Radioha Nuclear	alos in Granites: Evidence for Accelerated Decay	
1	Sunburst effect of α-damage trails	103
2	Schematic drawing of (a) a <sup>238</sup> U halo, and (b) a <sup>232</sup> Th	
	halo, with radii proportional to the ranges of α-particles	
	in air	104
3	Composite schematic drawing of (a) a <sup>218</sup> Po halo, (b) a <sup>238</sup> U	
	halo, (c) a 214Po halo, and (d) a 210Po halo, with radii	
	proportional to the ranges of α-particles in air	106
4	Some typical examples of the different radiohalos found	
	in granitic rocks in this study	119
5	Plot of the conventional age (in millions of years) versus	
	the total number of radiohalos per slide (per sample) for	
	each granitic pluton	122
6	Plot of the conventional age (in millions of years) versus	
	the number of Po radiohalos per slide (per sample) for	
	each granitic pluton	123
7	Time sequence of diagrams to show schematically the	
	formation of 238U and 210Po radiohalos concurrently as	
	a result of hydrothermal fluid flow along biotite cleavage	
	planes	134
8	Cross-section of the margin of a magma chamber	154
9	<sup>218</sup> Po and <sup>214</sup> Po radiohalos centered along cracks in biotite	
	flakes and continuous overlapping overexposed 210Po	
	radiohalos	162
10	The effects of hydrothermal fluids on biotite—	
	chloritization and fluid inclusions	172
	Tracks in Zircons: Evidence for Abundant	
Nuclear	Decay	
1	Correlation of the Cambrian Tonto Group showing facies	
	changes in the western Grand Canyon	217

Figure	Title	Page
2	Map of Utah showing the location of the three Brushy Basin	
	Member stratigraphic sections sampled	220
3	Schematic measured stratigraphic section showing the	
	lithologies and unit numbers in the Morrison Formation,	
	Notom, Utah	221
4	Schematic measured stratigraphic section showing the	
	lithologies and unit numbers in the Morrison Formation	
	in the Brushy Basin, west of Blanding, Utah	222
5	Schematic measured stratigraphic section showing the	
	lithologies in the Brushy Basin Member of the Morrison	
	Formation at Montezuma Creek, Utah	224
6	Map showing the distribution of the Peach Spring Tuff	225
7	Map of the Kingman area, Arizona, showing the local	
	extent of the Peach Springs Tuff	226
8	Schematic measured section through the Peach Spring	
	Tuff along Interstate-40 west of Kingman, Arizona	228
9	Some of the zircon grains recovered from six of the	
	tuff samples in this study	234
10	The spontaneous fission tracks in the polished and	
	etched surfaces of some of the mounted zircon grains	
	in five of the tuff samples in this study	236
11	Basic construction of a normal radial plot	240
12	Simplified structure of a normal radial plot and an	
	arc sin radial plot	241
13	Radial plots and histograms of the individual zircon	
	grain fission track ages in the early Middle Cambrian	
	tuff samples from the western Grand Canyon	243
14	Radial plots and histograms of the individual zircon grain	10413
	fission track ages in the Upper Jurassic Morrison Formation	
	tuff samples from south-eastern Utah	244
15	Radial plots and histograms of the individual zircon grain	
8.530	fission track ages in the Miocene Peach Springs Tuff samples	
	from south-eastern California and western Arizona	246
	arm of the court of Jan 17 for the San California and the San California and San California and San California	

Figure	Title	Page
16	The XRD patterns for the oriented and glycolated $<2-4\mu m$	
	fractions of Muav and Tapeats tuff samples MT-3 and TT-1	125/200
	respectively	265
17	Proportion of illite layers in mixed-layer illite/smectite	
	versus depth and temperature from wells in the Gulf of	
	Mexico coast region	267
18	Zircon grains from Muav tuff sample MT-3 selected for	
	U-Th-Pb radioisotope analyses	269
19	Zircon grains from Tapeats tuff sample TT-1 selected for	
	U-Th-Pb radioisotope analyses	270
20	Concordia plots of the U-Pb radioisotope data obtained	
	for zircon grains from Muav tuff sample MT-3	272
21	<sup>206</sup> Pb/ <sup>204</sup> Pb versus <sup>207</sup> Pb/ <sup>204</sup> Pb isochrons fitted to the Pb	
	radioisotope data obtained from the six zircon grains from	
	Muav tuff sample MT-3	273
22	Concordia plot of the U-Pb radioisotope data obtained	
	from three zircon grains from Tapeats tuff sample TT-1	274
23	<sup>206</sup> Pb/ <sup>204</sup> Pb versus <sup>207</sup> Pb/ <sup>204</sup> Pb isochrons fitted to the Pb	
	radioisotope data obtained from the six zircon grains from	
	Tapeats tuff sample TT-1	275
24	Schematic illustration of the process of formation of a	
The state of the s	fission track in a crystalline insulating solid	288
25	A comparison of specimen ages determined by fission	
1777	track analyses with those from historical or other	
	radiometric sources	289
26	Diagram to show the dating range for fission track analysis	
20	of different kinds of geological material according to U	
	content	291
27	Schematic illustration of the population method of fission	271
21	track analysis	292
28	Schematic illustration of the difference between $4\pi$	292
20	(spherical) and $2\pi$ (hemi-spherical) geometry in track	
	(spherical) and $2\pi$ (nemi-spherical) geometry in track formation	294
	TOTHIALION	294

Figure	Title	Page
29	Schematic illustration of the external detector method of	
	fission track analysis	295
30	Fading of fission tracks in apatite and sphene	306
31	Closing temperatures for retention of fission tracks for	
	minerals cooling at different rates	308
Do Radi	oisotope Clocks Need Repair? Testing the	
Assumpt	tions of Isochron Dating Using K-Ar, Rb-Sr,	
Sm-Nd,	and Pb-Pb Isotopes	
1	Location map showing the distribution of Precambrian rock	S
	in the northern Rocky Mountain region	330
2	Location of the Bass Rapids diabase sill in Grand Canyon,	
	northern Arizona	332
3	Composite Rb-Sr whole-rock isochron from the Long Lake	
	granitic complex in the southeastern Beartooth Mountains	
	of northwestern Wyoming	334
4	The original Rb-Sr whole-rock isochron plot for the Bass	
	Rapids diabase sill	337
5	Diagrammatic section through the Bass Rapids sill	
	showing the 6 m thick granophyre capping above the 85 m	
	thick diabase body of the sill	343
6	Rb-Sr mineral isochron for the Beartooth andesitic	
	amphibolite	354
7	Sm-Nd mineral isochron for the Beartooth andesitic	
	amphibolite	354
8	Pb-Pb mineral isochron for the Beartooth andesitic	
	amphibolite	355
9	<sup>40</sup> K versus <sup>40</sup> Ar* in the Bass Rapids diabase sill	358
10	<sup>40</sup> K/ <sup>36</sup> Ar versus <sup>40</sup> Ar/ <sup>36</sup> Ar in the Bass Rapids diabase sill	359
11	Rb-Sr whole-rock isochron for the Bass Rapids diabase sill	361
12	Rb-Sr mineral isochron for diabase samples DI-13 from the	
	Bass Rapids diabase sill	364

Figure	Title	Page
13	Rb-Sr mineral isochron for diabase sample DI-15 from the	
	Bass Rapids diabase sill	364
14	Rb-Sr magnetite mineral isochron for the Bass Rapids	
	diabase sill	365
15	147Sm/144Nd versus 143Nd/144Nd diagram for all eleven	
	whole-rock samples of the Bass Rapids diabase sill	366
16	147Sm/144Nd versus 143Nd/144Nd diagram for six mineral	
	fractions from diabase sample DI-13 (plus the whole rock)	
	from the Bass Rapids diabase sill	367
17	147Sm/144Nd versus 143Nd/144Nd diagram for eight mineral	
	fractions from diabase sample DI-15 (plus the whole rock)	
	from the Bass Rapids diabase sill	368
18	Sm-Nd magnetite mineral isochron for the Bass Rapids	
	diabase sill	369
19	<sup>206</sup> Pb/ <sup>204</sup> Pb versus <sup>207</sup> Pb/ <sup>204</sup> Pb diagram for the Bass Rapids	
	diabase sill, using all eleven whole-rock samples in the	
	isochron and age calculations	370
20	<sup>206</sup> Pb/ <sup>204</sup> Pb versus <sup>207</sup> Pb/ <sup>204</sup> Pb diagram for six mineral	
	fractions from diabase sample DI-13 (plus the whole	
	rock) from the Bass Rapids diabase sill	371
21	<sup>206</sup> Pb/ <sup>204</sup> Pb versus <sup>207</sup> Pb/ <sup>204</sup> Pb diagram for nine mineral	
	fractions from diabase sample DI-15 (plus the whole rock)	
	from the Bass Rapids diabase sill	372
22	<sup>206</sup> Pb/ <sup>204</sup> Pb versus <sup>207</sup> Pb/ <sup>204</sup> Pb diagram for six magnetite	
	mineral fractions from the Bass Rapids diabase sill	373
23	Isochron age versus mode of decay for the four radioisotope	
	systems within Bass Rapids diabase sill	384
Isochro	n Discordances and the Role of Inheritance and	
Mixing	of Radioisotopes in the Mantle and Crust	
070	5	
1	87Rb/86Sr versus 87Sr/86Sr isochron diagram for the Brahma	
	amphibolites in Grand Canyon	416
	Chapter Makes and Control of Cont	

Figure	Title	Page
2	147Sm144Nd versus 143Nd/144Nd isochron diagram for the	
	Brahma amphibolites in Grand Canyon	417
3	<sup>206</sup> Pb/ <sup>204</sup> Pb versus <sup>207</sup> Pb/ <sup>204</sup> Pb isochron diagram for the	
	Brahma amphibolites in Grand Canyon	418
4	87Rb/86Sr versus 87Sr/86Sr isochron diagram for the Elves	
	Chasm Granodiorite in Grand Canyon	419
5	147Sm/144Nd versus 143Nd/144Nd isochron diagram for the	
	Elves Chasm Granodiorite in Grand Canyon	420
6	<sup>206</sup> Pb/ <sup>207</sup> Pb versus <sup>207</sup> Pb/ <sup>204</sup> Pb isochron diagram for the	
	Elves Chasm Granodiorite in Grand Canyon	421
7	87Sr/86Sr versus 143Nd/144Nd isotope correlation diagram	
	with the whole-rock isotope data from the rock units in	
	this study plotted	423
8	<sup>206</sup> Pb/ <sup>204</sup> Pb versus <sup>87</sup> Sr/ <sup>86</sup> Sr isotope correlation diagram	
	with the whole-rock isotope data from the rock units in	
	this study plotted	424
9	<sup>206</sup> Pb/ <sup>204</sup> Pb versus <sup>143</sup> Nd/ <sup>144</sup> Nd isotope correlation diagram	
	with the whole-rock isotope data from the rock units in	
	this study plotted	425
10	<sup>206</sup> Pb/ <sup>204</sup> Pb versus <sup>207</sup> Pb/ <sup>204</sup> Pb isotope correlation diagram	
	with the whole-rock isotope data from the rock units in	
	this study plotted	426
11	Isochron ages for the Cardenas Basalt, Grand Canyon,	
	plotted against the present half-lives of the parent	
	radioisotopes	433
12	Isochron ages for the Brahma amphibolites, Grand	
	Canyon, plotted against the present half-lives of the	
	parent radioisotopes	433
13	Composite plot of isochron age versus atomic weight	
	for four radioisotope pairs and four Precambrian	
	formations in Grand Canyon	434

Figure	Title	Page
14	Plots of 87Sr/86Sr and 143Nd/144Nd versus 206Pb/204Pb for	
	the recent Ngauruhoe andesites, New Zealand, showing	
	calculated bulk mixing curves	437
15	Dynamic petrogenetic model for andesite magma genesis	
	beneath the Kermadec-Taupo Volcanic Arc subduction	
	system	438
16	87Sr/86Sr versus 143Nd/144Nd isotope correlation diagram	
	with the whole-rock isotope data from selected rock units	
	in this study plotted	440
17	<sup>206</sup> Pb/ <sup>204</sup> Pb versus <sup>87</sup> Sr/ <sup>86</sup> Sr isotope correlation diagram	
	with the whole-rock isotope data from selected rock units	
	in this study plotted	441
18	<sup>206</sup> Pb/ <sup>204</sup> Pb versus <sup>143</sup> Nd/ <sup>144</sup> Nd isotope correlation diagram	
	with the whole-rock isotope data from selected rock units	
	in this study plotted	442
19	<sup>206</sup> Pb/ <sup>204</sup> Pb versus <sup>207</sup> Pb/ <sup>204</sup> Pb isotope correlation diagram	
	with the whole-rock isotope data from selected rock units	
	in this study plotted	443
20	Diagrammatic section through the Bass Rapids sill	
	showing the granophyre "capping" on the diabase, the	
	contact hornfels, the location of samples, and selected	
	whole-rock geochemical and isotope data	445
21	The measured type section of the Cardenas Basalt in	
	Basalt Canyon, eastern Grand Canyon, showing the	
	location of samples and selected whole-rock geochemical	
	and isotope data	447
22	<sup>40</sup> K versus <sup>40</sup> Ar* isochron diagram for the Bass Rapids sill	
	(diabase and granophyre) and its contact hornfels in Grand	12779-000
	Canyon	449
23	87Rb/86Sr versus 87Sr/86Sr isochron diagram for the Bass	
	Rapids sill (diabase and granophyre) and its contact hornfels	
	in Grand Canyon	450

Figure	Title	Page
24	147Sm/144Nd versus 143Nd/144Nd isochron diagram for the	
	Bass Rapids sill (diabase and granophyre) and its contact	
	hornfels in Grand Canyon	451
25	<sup>206</sup> Pb/ <sup>204</sup> Pb versus <sup>207</sup> Pb/ <sup>204</sup> Pb isochron diagram for the	
	Bass Rapids sill (diabase and granophyre) and its contact	
	hornfels in Grand Canyon	452
26	Location and deposits of the Tongariro Volcanic Center,	
	Taupo Volcanic Zone, North Island, New Zealand	466
27	Map of the northwestern slopes of Mt. Ngauruhoe	
	showing the lava flows of 1949 and 1954, the 1975	
	avalanche deposits, and the location of samples	468
28	Generalized geologic map of the Uinkaret Plateau in the	
	western Grand Canyon region, showing the distribution of	
	basaltic rocks	470
29	Generalized geologic block diagram showing most of the	
	strata sequence and topographic form below the north rim	
	of Grand Canyon	471
30	Location map for the Somerset Dam layered mafic	
	intrusion near Brisbane on Australia's east coast	474
31	Detailed geologic map of the Somerset Dam layered	
	mafic intrusion, southeast Queensland, Australia	475
32	Stratigraphic column for the exposed portion of the	
	Somerset Dam layered mafic intrusion showing its inferred	
	cyclic units, rock densities, and modal compositions	476
33	Location of the Cardenas Basalt and the related Middle	
	Proterozoic named diabase sills and dikes in Grand Canyon	478
34	Outcrop areas of the Middle Proterozoic Apache Group,	
	Troy Quartzite, and associated basalts and diabase sills in	
	central and southern Arizona	487
35	Schematic stratigraphic column of the Apache Group, Troy	
	Quartzite, and associated basalts and diabase sills in	
	central Arizona	489

Figure	Title	Page
36	Simplified geologic map of Paleoproterozoic (Lower	
	Proterozoic) rocks in the Upper and Middle Granite	
	Gorges, Grand Canyon	498
37	Location maps, showing the Beartooth Mountains of	
	Montana and Wyoming and the Long Lake-Beartooth Pass	
	area on U.S. Highway 212	505
38	Simplified geologic map of an area adjacent to, and	
	southeast of, Long Lake and U.S. Highway 212, southern	
	Beartooth Mountains, Wyoming	506
Accelera	ated Decay: Theoretical Considerations	
1	The square-well potential with Coulomb barrier	527
2	Sudden change in the number of nodes (zero crossings).	
	The harmonic oscillator wavefunction for well depths of	
	58 MeV and 54 MeV	529
3	The decay constant versus well depth for the harmonic	
	oscillator interior potential	530
4	The real part of the Coulombic wavefunction outside	
	the Coulomb barrier	531
5	The exponentially diffuse boundary potential and the	
	corresponding wavefunction	531
6	Equilibrium levels of fluid flowing out of buckets through	
	valves that are opened to the same setting	534
7	The percentage <sup>234</sup> U/ <sup>238</sup> U as a function of time, assuming	
	that <sup>234</sup> U/ <sup>238</sup> U begins at 100%	536
8	The percentage <sup>234</sup> U/ <sup>238</sup> U as a function of time, assuming	
	that it begins at 100%	537
9	The position of a pendulum bob, confined to move in a	
	single vertical plane, can be completely specific by a single	
	linear coordinate	542
10	Three closed curves on the surface of a doughnut (torus)	
	illustrate inequivalent and equivalent closed paths	543

Figure	Title	Page
11	The ordinary vibration modes of closed strings and the	
	winding modes	544
12	Considering each point $(x, y, z)$ as equivalent to its	
	reflection $(-x, y, z)$ leads to the quotient space	549
13	A cross-section through a six-dimensional Calabi-Yau	
	shape, generated with Mathematica	550
14	The double β-decay scheme of <sup>130</sup> Te	568
15	The ratio R of (radiogenic 82Kr/82Se) divided by	
	(40Ar*/40K) versus time	571
<sup>™</sup> C Evid	lence for a Recent Global Flood	
and a Y	oung Earth	
1	Layout of the Vienna Environmental Research	
	Accelerator, typical of modern AMS facilities	592
2	Uniformitarian age as a function of 14C/C ratio, in	
	percent modern carbon	594
3	Distribution of 14C values for non-biogenic Precambrian	
	samples and biologic Phanerozoic samples	595
4	Histogram representation of AMS 14C analysis of ten	
	coal samples undertaken by the RATE 14C research project	606
5	Photo of three diamonds from the Orapa mine, Botswana	
	from the set analyzed in this study	611
Statistic	cal Determination of Genre in Biblical	
Hebrew	: Evidence for an Historical Reading of	
Genesis	1:1-2:3	
1	Production of a text by an author	640
2	3-D plots of paired-texts data, showing the contrasting	
	finite verb distribution for narrative and poetic versions	
	of the same event	653
3	Cluster analysis plot	654
4	3-D bar graph of finite verb distribution in narrative	658
5	3-D bar graph of finite verb distribution in poetry	660
170	CONTROL OF A CONTROL OF THE CONTROL OF THE CONTROL OF A C	

igure	Title	Page
6	Scatter plot showing the ratio of preterites to finite	
	verbs versus the ratio of imperfects to finite verbs	661
7	Scatter plot showing the ratio of preterites to finite	
	verbs versus the ratio of perfects to finite verbs	661
8	Side-by-side plot of the distribution of the relative	
	frequency of preterites in narrative vis-à-vis poetry	662
9	Logistic regression curve showing the probability a	
	passage is a narrative based on the ratio of preterites	
	to finite verbs	667
10	Plot showing the band of possible logistic curves derived	
	from random samples from the total population of texts	674
A1	3-D bar graph of the finite verb distribution in selected	
	narrative texts	693
A2	3-D bar graph of the finite verb distribution in selected	
	poetic texts	694
A3	Scatter plot for selected texts, with preterites/(finite verbs)	
	versus imperfects/(finite verbs)	696
A4	Scatter plot for selected texts, with preterites/(finite verbs)	
	versus perfects/(finite verbs)	696
C1	Scatter plot with preterites/(finite verbs) versus waw-perfects	s/
	(finite verbs), which shows the negative correlation of these	
	verb frequencies in narrative	704
Summa	ry of Evidence for a Young Earth	
rom the	e RATE Project	
1	SEM photomicrograph of a zircon crystal containing 238U,	
	<sup>206</sup> Pb, and <sup>4</sup> He extracted from the Jemez granodiorite,	
	Fenton Lake, New Mexico	740
2	Comparison of diffusivity between Creation and	
	uniformitarian models in zircon as a function of	
	temperature	741
3	Photos of <sup>210</sup> Po and <sup>218</sup> Po radiohalos	744

Figure	Title	Page
4	Plot of radiohalo occurrence in granites versus	
	conventional age for three categories of granites  —pre-Flood, Flood and post-Flood (?)	745
5	Composite plot of isochron age versus atomic weight for	
	four radioisotope pairs and four Precambrian formations	
	in Grand Canyon	750
6	Potential energy seen by the α-particle versus distance	
	from the nuclear center	751
7	Histogram of measured <sup>14</sup> C/C in percent of modern carbon concentration for forty Phanerozoic biological samples as	
	reported in the conventional literature	754
8	Side-by-side scatter plot of preterite verb forms in	
	narrative passages versus poetic	758
9	Plot showing the band of possible logistic curves derived	
	from random samples from the total population of texts	759

## Prologue

John D. Morris, Ph.D.\*

Evolution and deep time go hand in hand. Eons of time are required to generate and accumulate rare beneficial mutations into the vast array of life we see today. Natural selection cannot produce them, it only selects from the various mutants present. As the late George Wald, former Harvard biology professor, has said:

Time is in fact the hero of the plot ... Given so much time, the "impossible" becomes possible, the possible probable, and the probable virtually certain. One has only to wait: time itself performs the miracles

(The origin of life, Scientific American, 191(2), p. 49, 1954).

It's as if time heals all wounds. Time shrouds all the problems of evolution from view. But, what if the eons of time are a myth?

The authors of this book are convinced that evolution does not happen today, did not happen in the past, and could not happen ever. In fact, the more time available, the more deterioration of the genome occurs, and extinction will prevail. In reality, time is the enemy of evolution, not its hero. But without deep time, evolution can't even be entertained.

Concepts speculating on the long ago past don't occupy the same tier of credibility as present day observations. The historical sciences may be legitimate exercises, but they are not the same as the science of observable processes.

For instance, we know how a clam lives, assimilates its food, moves around, reproduces and dies. Furthermore, we observe an impressive variety of clams, and in many cases we even know ancestral relationships among some of the varieties, for they developed in observable time. But what non-clam evolved into a clam in the unobserved past? How did it happen? These historical questions can't be answered with certainty

<sup>·</sup> President, Institute for Creation Research, Santee, California

in the present. How can we investigate the long-ago past?

Geology students are taught to approach a rock outcrop or laboratory experiment with multiple working hypotheses in mind. Predict the data expected from each hypothesis, and then put them to the test. Gather the data. Gather all the data. Then see which hypothesis is best supported by the data. That hypothesis is the one most likely correct.

But time questions differ from others. Lacking a time machine, we can't scientifically observe the past. Today we can only observe and test the remnants of past processes preserved in the present. Thus the past, especially the long-ago past, is inaccessible to science. Even so, deep time has achieved immunity from comparison to any other model. To many, the reality of immeasurably long ages has become such a dogma it never gets questioned at all. The investigator may try to fine tune a date—is the rock 1.35 or 1.37 billion years old?—but no totally different hypothesis merits consideration. Until now, that is.

In 1997 an eight year research initiative to investigate this very issue was launched. Entitled Radioisotopes and the Age of The Earth (RATE), and staffed by experts qualified in relevant fields, it attempted to test the validity of radioisotope dating of rocks, source of the main evidence for deep time. In the true spirit of multiple working hypotheses, these scientists determined to put the basic concept to the test. They determined to gather data heretofore ignored or censored by adherence to only one idea. They purposed to run experiments never before conceived. They demanded that the deep time way of thinking be put to the test, and results compared to the expectations of both old and young earth models. They were intent on seeing which of the two schools of thought was more likely correct.

It would be inaccurate to claim that the RATE scientists had no bias. All are dedicated Christians and all hold the Bible as correct in all its teachings, even in matters of science and history. They have become convinced that belief in the Bible is a reasonable position, well supported by facts and logic. While scientists often make pronouncements contrary to Scripture, no verified fact of science contradicts any of its teachings, even as it relates to the unobserved past. The Bible doesn't give all the details, but it does provide the overall framework within

which historical and scientific data can be interpreted in a robust and intellectually satisfying manner.

The concept of biased scientists may come as a surprise to some, but in reality all investigators have a bias before starting their studies and all experiments are chosen and conducted within that bias. One's thinking can be dominated by generally uniform processes over long ages or by rapid and catastrophic processes over a comparatively short timescale. Since all scientists are locked into the present, studying data and running experiments in the present, limited by their present knowledge, skills and logic, accurately reconstructing the past is virtually impossible. Without a guide, without the big picture provided by a capable and reliable observer of the past, we will all fall short of absolute truth. The RATE scientists are convinced that the Bible's picture of the past is the proper one to inform our present investigation.

The Bible tells of an orderly progression of six 24-hour days only thousands of years ago during which all things were created. Each step was necessary before the next until the earth was fully prepared for animal life and finally man. The oceans, the atmosphere, the continents, the plants, the Sun, Moon, and stars, the animals—each formed by creative processes quite unlike processes of today—each in its place and each accomplishing its purpose. Finally, with man as its steward, it was all "very good" (Genesis 1:31) from the Creator's perspective. But man then chose to reject God's authority over him, immediately precipitating the ruination of creation, followed by a world-restructuring flood in Noah's day. Today we live and do our science in the cursed, flooded, remnant of a once "very good" world, making historical investigations difficult.

If we deny the historicity of these great world-changing events, we have little chance of discerning earth's true past. Without the certainty of a fully-functional earth created by God in the beginning, we might misinterpret that functional maturity for age. Without factoring the great Flood into our thinking, we might assign great time spans to things formed very rapidly in that high energy environment. If we limit our thinking to the processes happening today, at only the rates, scales and intensities we observe today, we cannot arrive at the truth about

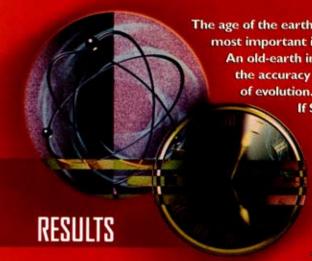
the earth's past and how it came to be in the state it is in today. With the Bible's big picture as our framework, we have a chance of properly reconstructing the earth's history and understanding its present condition.

During the first three years of the RATE initiative radioisotope dating methods and theory were put to the test. The results of those methods were shown to be discordant, inconclusive and sometimes bizarre. Only by selective reporting of the results, and blind adherence to the underlying unprovable assumptions involved, do they even appear to point in the direction of deep time. In short, it was conclusively shown that the radioisotope dating methods do not unequivocally yield the accurate ages of the items tested. But they were doing something. What were they really showing? Is there a better understanding of them which can replace the failed one? The RATE book published after the first three years revealed the questionable state of the radioisotope dating methods and proposed experiments which could shed some light in the darkness.

The next five years were occupied by conducting those experiments and analyzing the data and theory. This book presents the results. Of course, not every question was asked, thus much more remains to be done. But every investigation attempted yielded a positive result for the Creation/Flood/young earth model. Numerous other investigations were suggested.

Does this work prove the young earth model? Of course not, as no historical reconstruction can be fully proved. But it does show that of the two viewpoints the young earth model is better supported and more consistent with **all** the radioisotope evidence.

Thus this book opens a new chapter in the origins controversy. As never before it calls into question the deep time model and places the Biblically compatible young earth model on a level of scholarship never before achieved and archived. Its pages contain many profound thoughts, which will shake current scientific orthodoxy to its core. It deserves careful consideration by all who value truth.



The age of the earth stands out as one of the most important issues among Christians today!

An old-earth interpretation clouds our view of the accuracy of Scripture. It supports the theory of evolution. It affects our perception of God.

If Scripture can't be trusted on the age of the earth, how can it be trusted on other issues?

But have we been misled about the reliability of radioactive dating methods? The RATE group believes we have. The RATE group, consisting of eight young-earth creationist geologists, geochemists, geophysicists, physicists, and a Hebraist.

cooperated to research the issue of *Radioisotopes and the Age of the Earth*.

They dared to ask the tough questions and thus found an alternative explanation for the billions of years conventionally assigned to rocks. They found answers like:

- · Large amounts of nuclear decay have occurred during earth history.
- Helium concentrations in rocks confirm massive nuclear decay.
- · Helium diffusion and radiohalos document accelerated nuclear decay.
- · Coal and diamonds are young because they contain carbon-14.
- Theoretical studies support accelerated decay.
- · Conventional dating methods are unreliable.
- · Creation and the Flood are recent historical events.
- The Creation and Flood accounts are accurate historical narratives.

These and many other answers are provided in this book. The RATE researchers have solved a major portion of the radioisotope riddle. This book reports the answers to the questions raised in *Radioisotopes and the Age of the Earth* at the beginning of the five-year research project in 2000. A lay version of this report and a video documentary both entitled *Thousands not Billions: Challenging an Icon of Evolution* are also available.



CRS
CREATION
RESEARCH
SOCIETY

