

# We Remember



1  
00:00:01,633 --> 00:00:07,633  
[music playing]

2  
00:00:12,466 --> 00:00:15,033  
- Astrobiologists have long  
understood that the search

3  
00:00:15,033 --> 00:00:17,833  
for life on other worlds begins  
with this world,

4  
00:00:17,833 --> 00:00:19,733  
with understanding  
the evolving relationship

5  
00:00:19,733 --> 00:00:22,400  
between life  
and its environment.

6  
00:00:22,400 --> 00:00:25,666  
No one understood this better  
than Dick Holland.

7  
00:00:25,666 --> 00:00:27,433  
Over the first 30 years  
of his career,

8  
00:00:27,433 --> 00:00:30,233  
mostly at Princeton University,  
Dick pioneered the study

9  
00:00:30,233 --> 00:00:31,966  
of Earth's atmosphere  
and oceans

10  
00:00:31,966 --> 00:00:35,133  
as evolving,  
coupled chemical systems.

11

00:00:35,133 --> 00:00:38,133

His approach was profound  
in its simplicity.

12

00:00:38,133 --> 00:00:40,266

As a theoritician,  
he did not pursue

13

00:00:40,266 --> 00:00:42,500

complex computational models.

14

00:00:42,500 --> 00:00:44,333

As an experimentalist,  
he was cautious

15

00:00:44,333 --> 00:00:46,433

about sophisticated techniques.

16

00:00:46,433 --> 00:00:49,133

As a field scientist,  
he did not organize large,

17

00:00:49,133 --> 00:00:51,233

complicated campaigns.

18

00:00:51,233 --> 00:00:53,800

Instead, Dick always sought  
the simplest path to the heart

19

00:00:53,800 --> 00:00:56,266

of even the most complex  
questions.

20

00:00:56,266 --> 00:00:58,633

Combining a nearly encyclopedic  
knowledge

21

00:00:58,633 --> 00:01:01,866

with basic thermodynamic  
and mass balance concepts,

22

00:01:01,866 --> 00:01:03,566

Dick constructed  
logical arguments

23

00:01:03,566 --> 00:01:06,800

while others were often lost  
in equations or data.

24

00:01:06,800 --> 00:01:10,166

"This doesn't necessarily prove  
anything," Dick so often said

25

00:01:10,166 --> 00:01:12,533

before proceeding to lay out  
an argument so elegant,

26

00:01:12,533 --> 00:01:15,966

so informed, and so logical  
that it might as well have been

27

00:01:15,966 --> 00:01:18,266

a geometric proof.

28

00:01:18,266 --> 00:01:19,833

Dick taught his style  
and perspective

29

00:01:19,833 --> 00:01:22,100

to a generation of scholars  
by writing two books

30

00:01:22,100 --> 00:01:23,933

that quickly became classics.

31

00:01:23,933 --> 00:01:26,333

These masterpieces pulled  
together a tremendous amount

32

00:01:26,333 --> 00:01:29,300  
of information and original  
thinking to sketch out

33

00:01:29,300 --> 00:01:32,700  
a working model of the Earth's  
system and its evolution.

34

00:01:32,700 --> 00:01:34,633  
In this way,  
Dick organized and defined

35

00:01:34,633 --> 00:01:37,966  
many of the key questions  
that drive the field even today.

36

00:01:37,966 --> 00:01:40,433  
We haven't looked at Earth  
or for life beyond

37

00:01:40,433 --> 00:01:42,300  
the same way since.

38

00:01:42,300 --> 00:01:44,266  
After moving to Harvard,  
Dick proceeded to spend

39

00:01:44,266 --> 00:01:47,266  
most of the next 25 years  
trying to answer one

40

00:01:47,266 --> 00:01:49,300  
of those key questions:

41

00:01:49,300 --> 00:01:51,633  
What caused the increase  
atmospheric oxygen

42

00:01:51,633 --> 00:01:53,300  
halfway through Earth history?

43

00:01:53,300 --> 00:01:57,500

A transition that Dick dubbed  
"The Great Oxidation Event."

44

00:01:57,500 --> 00:01:59,966

Unfortunately, he departed us  
before he could answer

45

00:01:59,966 --> 00:02:01,900

this elusive question.

46

00:02:01,900 --> 00:02:05,200

Dick left it as an exercise  
for his many students.

47

00:02:05,200 --> 00:02:08,266

We carry his legacy  
into the future.

48

00:02:11,600 --> 00:02:17,600

[music playing]

49

00:02:21,966 --> 00:02:24,633

- Dr. Robert A. Wharton  
died on Wednesday,

50

00:02:24,633 --> 00:02:28,866

September 19, 2012,  
in Rapid City, South Dakota.

51

00:02:28,866 --> 00:02:31,566

Bob had been diagnosed  
with cancer in 2011,

52

00:02:31,566 --> 00:02:34,166

and following treatment  
had been declared cancer-free.

53

00:02:34,166 --> 00:02:36,166

However, he died  
from complications

54

00:02:36,166 --> 00:02:39,900

resulting from  
the early 2012 treatments.

55

00:02:39,900 --> 00:02:42,533

Bob received his PhD in botany  
from Virginia Tech

56

00:02:42,533 --> 00:02:46,133

and his bachelor's and master's  
from Humboldt State University.

57

00:02:46,133 --> 00:02:47,733

In later years,  
he attended both

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00:02:47,733 --> 00:02:50,066

the Harvard Institute  
of Educational Management

59

00:02:50,066 --> 00:02:52,366

and the Stanford Graduate  
School of Business

60

00:02:52,366 --> 00:02:55,766

Senior Executive Program.

61

00:02:55,766 --> 00:02:57,866

Bob's leadership  
and scientific career

62

00:02:57,866 --> 00:03:00,200

spans several decades  
in the academic,

63

00:03:00,200 --> 00:03:02,733

federal service,  
and private sector.

64

00:03:02,733 --> 00:03:05,100

He was well known for his  
scientific investigations

65

00:03:05,100 --> 00:03:08,300

of the perennially ice-covered  
lakes McMurdo Dry Valleys

66

00:03:08,300 --> 00:03:11,066

and their use as analogs  
to Precambrian ecosystems

67

00:03:11,066 --> 00:03:14,366

on early Earth and as analogs  
for potential aquatic habitats

68

00:03:14,366 --> 00:03:16,200

on early Mars.

69

00:03:16,200 --> 00:03:19,666

In 1993, Bob was instrumental  
in organizing and leading

70

00:03:19,666 --> 00:03:22,600

the McMurdo Long-Term Ecological  
Research Project,

71

00:03:22,600 --> 00:03:25,566

a National Science Foundation  
funded interdisciplinary

72

00:03:25,566 --> 00:03:27,800

and multidisciplinary study  
of the aquatic

73

00:03:27,800 --> 00:03:30,700

and terrestrial ecosystems

in the ice-free regions

74

00:03:30,700 --> 00:03:33,600  
of the McMurdo Dry Valleys.

75

00:03:33,600 --> 00:03:35,700  
Bob served as  
a Visiting Senior Scientist

76

00:03:35,700 --> 00:03:38,100  
at NASA Headquarters  
in Washington, D.C.,

77

00:03:38,100 --> 00:03:39,700  
providing programmatic support

78

00:03:39,700 --> 00:03:43,533  
for NASA's Exobiology Controlled  
Ecological Life Support System

79

00:03:43,533 --> 00:03:45,466  
and Biospherics Programs,

80

00:03:45,466 --> 00:03:48,666  
and contributing to many studies  
aimed at supporting

81

00:03:48,666 --> 00:03:51,000  
the human exploration of Mars  
such as

82

00:03:51,000 --> 00:03:52,900  
the Strategic Exploration  
Initiative

83

00:03:52,900 --> 00:03:55,500  
and the Augustine Report.

84

00:03:55,500 --> 00:03:57,433

While at  
the Desert Research Institute,

85

00:03:57,433 --> 00:03:59,366

Bob served  
as Vice-President for Research

86

00:03:59,366 --> 00:04:01,566

and as a research professor.

87

00:04:01,566 --> 00:04:03,300

Bob served as  
the Executive Officer

88

00:04:03,300 --> 00:04:04,866

for the National Science  
Foundation's

89

00:04:04,866 --> 00:04:07,466

Office Support Programs.

90

00:04:07,466 --> 00:04:10,233

Following his time at  
the National Science Foundation,

91

00:04:10,233 --> 00:04:12,433

Bob served as Provost  
and Vice-President

92

00:04:12,433 --> 00:04:15,533

for Academic Affairs  
at Idaho State University.

93

00:04:15,533 --> 00:04:18,366

In 2008, Bob became  
the 18th President

94

00:04:18,366 --> 00:04:21,100

of the South Dakota School  
of Mines and Technology

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00:04:21,100 --> 00:04:23,366

where he quickly embarked  
on a bold path

96

00:04:23,366 --> 00:04:25,266

to increase  
the university's stature

97

00:04:25,266 --> 00:04:28,733

as a world-class technological  
university.

98

00:04:28,733 --> 00:04:32,233

Having participated in  
11 expeditions to the Antarctic,

99

00:04:32,233 --> 00:04:34,466

Bob was recipient  
of the United States

100

00:04:34,466 --> 00:04:36,133

Antarctic Service Medal  
and served

101

00:04:36,133 --> 00:04:37,633

on the National Research  
Council's

102

00:04:37,633 --> 00:04:39,300

Polar Research Board.

103

00:04:39,300 --> 00:04:41,133

He was a fellow  
of the American Association

104

00:04:41,133 --> 00:04:42,966

for the Advancement of Science,

105

00:04:42,966 --> 00:04:47,233  
the Royal Geographical Society,  
and the Explorers Club.

106  
00:04:47,233 --> 00:04:48,533  
Bob was a leader,

107  
00:04:48,533 --> 00:04:50,866  
an international polar  
research scientist,

108  
00:04:50,866 --> 00:04:53,866  
mentor, and above all,  
an explorer

109  
00:04:53,866 --> 00:04:55,000  
with a passion for climbing,

110  
00:04:55,000 --> 00:04:57,133  
who became  
a university president,

111  
00:04:57,133 --> 00:05:00,100  
and who had fun along the way.

112  
00:05:05,500 --> 00:05:11,500  
[music playing]

113  
00:05:16,033 --> 00:05:18,500  
- Carl Woese  
was the first scientist

114  
00:05:18,500 --> 00:05:22,300  
to map out the evolutionary  
history of all life on Earth.

115  
00:05:22,300 --> 00:05:26,066  
In so doing, he not only showed  
that all known life is related

116

00:05:26,066 --> 00:05:29,233

and descended from a common  
ancestral state,

117

00:05:29,233 --> 00:05:32,666

but he also overturned one  
of the major dogmas of biology

118

00:05:32,666 --> 00:05:34,833

with his discovery  
of the Archaea,

119

00:05:34,833 --> 00:05:37,100

the third domain of life.

120

00:05:37,100 --> 00:05:40,433

Because of Woese's work,  
it is now widely agreed

121

00:05:40,433 --> 00:05:42,933

that there are three,  
not two,

122

00:05:42,933 --> 00:05:44,700

primary divisions of life:

123

00:05:44,700 --> 00:05:48,300

The Eukarya, Bacteria,  
and Archaea.

124

00:05:48,300 --> 00:05:50,900

This classification scheme  
represents one

125

00:05:50,900 --> 00:05:54,333

of the 20th century's  
landmark achievements in science

126

00:05:54,333 --> 00:05:56,833

and has fundamentally changed  
our understanding

127

00:05:56,833 --> 00:05:59,533  
of evolutionary biology.

128

00:05:59,533 --> 00:06:03,366  
By basing his classification  
on the sequences of molecules

129

00:06:03,366 --> 00:06:07,166  
involved in the cell's earliest  
machinery for expressing genes

130

00:06:07,166 --> 00:06:10,566  
rather than purely physiological  
characteristics,

131

00:06:10,566 --> 00:06:13,866  
Woese opened up a new way  
to quantify evolution,

132

00:06:13,866 --> 00:06:15,933  
a new window  
on the origin of life,

133

00:06:15,933 --> 00:06:18,700  
and a scientifically  
rigorous way

134

00:06:18,700 --> 00:06:22,566  
to identify and classify  
all organisms.

135

00:06:22,566 --> 00:06:24,400  
This has been especially  
transformative

136

00:06:24,400 --> 00:06:27,400  
in the case of microbes,

the vast majority of which

137

00:06:27,400 --> 00:06:29,833

cannot be cultured  
but which represent

138

00:06:29,833 --> 00:06:34,166

the principle component  
of the Earth's biosphere.

139

00:06:34,166 --> 00:06:37,833

Woese's motivation to initiate  
his sequencing project

140

00:06:37,833 --> 00:06:40,833

was to understand  
the very earliest phases of life

141

00:06:40,833 --> 00:06:44,733

in an attempt to understand how  
the complexity of living systems

142

00:06:44,733 --> 00:06:48,200

evolved from much earlier  
and simpler states.

143

00:06:48,200 --> 00:06:51,666

His abiding interest was  
the evolutionary process itself,

144

00:06:51,666 --> 00:06:54,733

and he personally regarded  
the discovery of the Archaea

145

00:06:54,733 --> 00:06:57,000

as a spin-off,  
albeit one

146

00:06:57,000 --> 00:06:59,633

with incredibly important

ramifications

147

00:06:59,633 --> 00:07:02,833

that are only now being  
fully understood.

148

00:07:02,833 --> 00:07:05,333

Woese's work was  
an early forerunner

149

00:07:05,333 --> 00:07:08,833

of today's genomic biology  
with many extensions

150

00:07:08,833 --> 00:07:11,900

that are revolutionizing  
microbiology, ecology,

151

00:07:11,900 --> 00:07:14,300

and even the health sciences.

152

00:07:14,300 --> 00:07:16,000

His many accolades includes

153

00:07:16,000 --> 00:07:19,566

the 2003 Crafoord Prize  
for Biosciences

154

00:07:19,566 --> 00:07:22,933

awarded by the Royal Swedish  
Academy of Sciences,

155

00:07:22,933 --> 00:07:24,500

the Leeuwenhoek Medal,

156

00:07:24,500 --> 00:07:26,766

the U.S. National Medal  
of Science,

157

00:07:26,766 --> 00:07:30,233  
and membership of the National  
Academy of Sciences.

158  
00:07:30,233 --> 00:07:33,033  
His contributions  
to astrobiology live on

159  
00:07:33,033 --> 00:07:35,333  
in his experimental discoveries,

160  
00:07:35,333 --> 00:07:37,966  
his theoretical work  
on the genetic code,

161  
00:07:37,966 --> 00:07:41,366  
and his vision of the  
evolutionary process in action.

162  
00:07:45,266 --> 00:07:51,266  
[music playing]

163  
00:07:55,600 --> 00:08:01,666  
- David McKay passed away  
on February 19, 2013, at age 76,

164  
00:08:01,666 --> 00:08:04,600  
ending a distinguished career  
in lunar science,

165  
00:08:04,600 --> 00:08:07,366  
meteoritics, and astrobiology.

166  
00:08:07,366 --> 00:08:10,366  
He played key roles in NASA's  
lunar exploration

167  
00:08:10,366 --> 00:08:14,333  
and astrobiology programs,  
understanding the lunar regolith

168

00:08:14,333 --> 00:08:17,733  
and the processes operating  
in the near lunar environment,

169

00:08:17,733 --> 00:08:21,666  
developing ideas for utilization  
of planetary resources,

170

00:08:21,666 --> 00:08:24,366  
examination of Martian  
meteorites for potential

171

00:08:24,366 --> 00:08:27,066  
biogenic signatures,  
and the formation

172

00:08:27,066 --> 00:08:30,033  
of NASA's Astrobiology Program.

173

00:08:30,033 --> 00:08:33,033  
At the time of his death,  
he was Chief Scientist

174

00:08:33,033 --> 00:08:35,533  
for Astrobiology  
and Planetary Science

175

00:08:35,533 --> 00:08:38,666  
and Exploration at NASA's  
Johnson Space Center,

176

00:08:38,666 --> 00:08:40,666  
Houston, Texas.

177

00:08:40,666 --> 00:08:43,666  
He has been described  
as a pioneer among pioneers

178

00:08:43,666 --> 00:08:46,300  
in the space program.

179

00:08:46,300 --> 00:08:48,833  
David joined NASA's  
Manned Spacecraft Center

180

00:08:48,833 --> 00:08:52,333  
in Houston in June 1965  
to train astronauts

181

00:08:52,333 --> 00:08:54,600  
to collect rocks on the Moon.

182

00:08:54,600 --> 00:08:57,666  
He was the only geologist  
present in Mission Control

183

00:08:57,666 --> 00:09:01,900  
during the lunar landing  
in July 1969.

184

00:09:01,900 --> 00:09:04,066  
To many  
in the scientific community,

185

00:09:04,066 --> 00:09:06,066  
David is best known  
as the lead author

186

00:09:06,066 --> 00:09:09,533  
of the 1996 "Science" paper  
that presented evidence

187

00:09:09,533 --> 00:09:15,533  
for ancient Martian life in  
the Allan Hills 84001 meteorite.

188

00:09:15,533 --> 00:09:17,466  
The publication

of the "Science" paper

189

00:09:17,466 --> 00:09:20,133  
created an explosion  
of excitement and criticism

190

00:09:20,133 --> 00:09:21,900  
in equal measure.

191

00:09:21,900 --> 00:09:23,900  
The excitement surrounding  
the possibility

192

00:09:23,900 --> 00:09:26,600  
that Mars may have harbored  
ancient life

193

00:09:26,600 --> 00:09:28,733  
led spacefaring nations  
of the world

194

00:09:28,733 --> 00:09:32,766  
to re-ignite their  
Mars exploration programs.

195

00:09:32,766 --> 00:09:37,133  
The establishment of the NASA  
Astrobiology Institute in 1998

196

00:09:37,133 --> 00:09:40,566  
was also in part a consequence  
of David's pioneering work

197

00:09:40,566 --> 00:09:44,666  
on ALH84001.

198

00:09:44,666 --> 00:09:48,000  
David was married to Mary Fae  
for more than 40 years

199

00:09:48,000 --> 00:09:49,833

and was the father  
of three girls,

200

00:09:49,833 --> 00:09:52,233

Amy, Susy, and Jill.

201

00:09:52,233 --> 00:09:55,266

He was delighted  
to have three grandchildren.

202

00:09:55,266 --> 00:09:57,633

Dave was quiet and unassuming,

203

00:09:57,633 --> 00:10:01,400

had a sharp, humorous wit,  
and a genteel manner.

204

00:10:01,400 --> 00:10:04,300

His love of science inspired  
two of his daughters

205

00:10:04,300 --> 00:10:06,733

to complete their PhDs.

206

00:10:06,733 --> 00:10:11,133

He enjoyed traveling,  
particularly to Japan.

207

00:10:11,133 --> 00:10:12,933

We miss you and thank you,  
David,

208

00:10:12,933 --> 00:10:16,300

for your friendship and guidance  
over these many years.

209

00:10:16,300 --> 00:10:20,466

You have helped point the way

to the Moon and to Mars.

210

00:10:23,700 --> 00:10:29,700

[music playing]

211

00:10:34,033 --> 00:10:35,866

- Planetary science  
and exploration

212

00:10:35,866 --> 00:10:38,000

were Tom's lifelong passions.

213

00:10:38,000 --> 00:10:40,000

Already, at the tender age  
of seven,

214

00:10:40,000 --> 00:10:42,600

Tom's interest  
in things extraterrestrial

215

00:10:42,600 --> 00:10:44,766

was kindled by his discovery  
of a painting

216

00:10:44,766 --> 00:10:47,733

of a Martian landscape  
in his elementary school.

217

00:10:47,733 --> 00:10:50,300

Before the age of Sputnik,  
Tom was already busy

218

00:10:50,300 --> 00:10:53,033

building rockets  
with his family members.

219

00:10:53,033 --> 00:10:56,066

He would go on to study at  
the University of South Florida

220

00:10:56,066 --> 00:10:58,566

and Case Western  
Reserve University.

221

00:10:58,566 --> 00:11:02,200

In 1976, he joined the faculty  
in the Department of Physics

222

00:11:02,200 --> 00:11:04,866

at the University of Alabama  
at Birmingham

223

00:11:04,866 --> 00:11:06,066

where he would teach astronomy

224

00:11:06,066 --> 00:11:08,533

to over 10,000  
undergraduate students

225

00:11:08,533 --> 00:11:10,466

over the next 30 years.

226

00:11:10,466 --> 00:11:13,000

Combining his love of astronomy  
with interests

227

00:11:13,000 --> 00:11:15,900

in chemistry and geology,  
he explored space

228

00:11:15,900 --> 00:11:18,333

from his laboratory,  
studying the properties

229

00:11:18,333 --> 00:11:22,000

of stardust, meteorites,  
and geological samples,

230

00:11:22,000 --> 00:11:24,033

including what may be  
microfossils

231

00:11:24,033 --> 00:11:26,433

from the beginning of life  
on Earth.

232

00:11:26,433 --> 00:11:29,400

His diverse scientific portfolio  
also included topics

233

00:11:29,400 --> 00:11:31,333

ranging from stellar  
magnetic fields

234

00:11:31,333 --> 00:11:34,833

to the origin of the K-T events  
that wiped out the dinosaurs

235

00:11:34,833 --> 00:11:36,933

to the composition  
of interstellar dust

236

00:11:36,933 --> 00:11:38,866

and the mineralogy  
and astrobiology

237

00:11:38,866 --> 00:11:40,900

of the surface of Mars.

238

00:11:40,900 --> 00:11:43,633

He was very generous with  
his time in educating the public

239

00:11:43,633 --> 00:11:46,766

and was often seen, heard,  
or read on local TV,

240

00:11:46,766 --> 00:11:48,866

radio, and newspapers.

241

00:11:48,866 --> 00:11:50,633

Tom was nothing  
if not passionate,

242

00:11:50,633 --> 00:11:54,166

and he was especially so  
for planetary exploration.

243

00:11:54,166 --> 00:11:56,066

The highlight of his career  
was when he joined

244

00:11:56,066 --> 00:11:58,366

the Mars Exploration Rover team.

245

00:11:58,366 --> 00:12:00,366

He was on hand to send  
the control commands

246

00:12:00,366 --> 00:12:03,200

to the rover "Spirit" when it  
reached out its robotic arm

247

00:12:03,200 --> 00:12:05,766

to study the rock Adirondack,

248

00:12:05,766 --> 00:12:08,233

and thereby Tom fulfilled  
his childhood dream

249

00:12:08,233 --> 00:12:10,500

of touching another world.

250

00:12:10,500 --> 00:12:12,466

The MER team later honored Tom  
by naming

251

00:12:12,466 --> 00:12:14,966

a Martian rock formation  
Wdowiak Ridge

252  
00:12:14,966 --> 00:12:17,800  
as a memorial  
to his contributions.

253  
00:12:20,333 --> 00:12:26,333  
[music playing]

254  
00:12:30,966 --> 00:12:33,300  
- John Billingham was born  
in the United Kingdom

255  
00:12:33,300 --> 00:12:37,500  
and began his medical career  
in London in 1954.

256  
00:12:37,500 --> 00:12:41,333  
Thereafter, he served in  
the Royal Air Force until 1963

257  
00:12:41,333 --> 00:12:42,766  
when he accepted a position

258  
00:12:42,766 --> 00:12:44,500  
as the Head of Environmental  
Physiology

259  
00:12:44,500 --> 00:12:47,300  
at NASA's Manned Spaceflight  
Center in Houston,

260  
00:12:47,300 --> 00:12:49,466  
emigrating with his wife  
Margaret,

261  
00:12:49,466 --> 00:12:53,700  
later an eminent physician and  
pathologist in her own right.

262

00:12:53,700 --> 00:12:57,200

In 1965, he became Chief  
of the Biotechnology Division

263

00:12:57,200 --> 00:12:59,733

at NASA Ames  
where he became familiar

264

00:12:59,733 --> 00:13:02,100

with the center's work  
in exobiology,

265

00:13:02,100 --> 00:13:04,300

leading to a collaboration  
with Barney Oliver

266

00:13:04,300 --> 00:13:06,333

of Hewlett-Packard  
to co-direct

267

00:13:06,333 --> 00:13:10,333

the 1971 Summer Study  
to assess what would be required

268

00:13:10,333 --> 00:13:13,566

to mount a realistic effort  
aimed at detecting the existence

269

00:13:13,566 --> 00:13:16,833

of extraterrestrial  
intelligent life.

270

00:13:16,833 --> 00:13:20,033

Using Project Cyclops  
as a jumping off point, "JB,"

271

00:13:20,033 --> 00:13:23,566

as his friends knew him, became  
a lifelong advocate for SETI

272

00:13:23,566 --> 00:13:25,500  
and the people  
who made it all possible

273

00:13:25,500 --> 00:13:27,766  
both formally and informally.

274

00:13:27,766 --> 00:13:31,133  
He was a leader in a community  
of creative and dedicated people

275

00:13:31,133 --> 00:13:34,000  
who shared a thirst for  
knowledge of life beyond Earth

276

00:13:34,000 --> 00:13:37,866  
and was proud to be known by  
the company he kept as a result.

277

00:13:37,866 --> 00:13:39,933  
Surely he garnered  
official recognition

278

00:13:39,933 --> 00:13:43,266  
for his efforts along the way,  
but unofficial recognition

279

00:13:43,266 --> 00:13:46,433  
came in many satisfactory forms  
as well.

280

00:13:46,433 --> 00:13:48,766  
JB kept distinguished company  
at work,

281

00:13:48,766 --> 00:13:51,666  
but none more distinguished  
than at home.

282

00:13:51,666 --> 00:13:53,766

The talented  
and dedicated people

283

00:13:53,766 --> 00:13:55,966

who come from foreign lands  
to participate

284

00:13:55,966 --> 00:13:59,633

in a vision of space exploration  
is a lesson that NASA

285

00:13:59,633 --> 00:14:02,333

and the U.S. government  
should never forget.

286

00:14:02,333 --> 00:14:04,200

That John Billingham  
was among them

287

00:14:04,200 --> 00:14:07,500

and that he shared in a vision  
of an infinite future

288

00:14:07,500 --> 00:14:10,033

in a universe operating  
at the speed of light

289

00:14:10,033 --> 00:14:12,700

was and is to our great benefit.

290

00:14:15,700 --> 00:14:21,700

[music playing]

291

00:14:26,266 --> 00:14:28,666

- Bishun Khare was best known  
for his studies

292

00:14:28,666 --> 00:14:30,566

of the formation  
of organic solids

293

00:14:30,566 --> 00:14:32,233  
in the atmosphere of Titan.

294

00:14:32,233 --> 00:14:34,266  
In a seminal paper in "Icarus,"

295

00:14:34,266 --> 00:14:37,000  
Khare together with Carl Sagan  
and others determined

296

00:14:37,000 --> 00:14:39,900  
the optical properties  
of solid organic material

297

00:14:39,900 --> 00:14:42,733  
produced under simulated  
Titan conditions.

298

00:14:42,733 --> 00:14:45,866  
They referred to this  
solid material as tholin.

299

00:14:45,866 --> 00:14:49,200  
Khare and his team measured  
the indices of refraction

300

00:14:49,200 --> 00:14:53,033  
of Titan tholin over a very  
broad range of wavelengths

301

00:14:53,033 --> 00:14:55,933  
from the microwave to the X-ray.

302

00:14:55,933 --> 00:14:59,366  
Modelers like me quickly found  
that the optical properties

303

00:14:59,366 --> 00:15:02,866  
could be used to determine the  
reflectance of the atmosphere,

304

00:15:02,866 --> 00:15:06,400  
and calculations made with these  
laboratory values agreed well

305

00:15:06,400 --> 00:15:10,566  
with telescopic and spacecraft  
observations of Titan.

306

00:15:10,566 --> 00:15:12,866  
This agreement between  
the laboratory results

307

00:15:12,866 --> 00:15:16,366  
and the modeling was the basis  
for the growing acceptance

308

00:15:16,366 --> 00:15:20,100  
of organic solids as the source  
of the haze on Titan.

309

00:15:20,100 --> 00:15:23,700  
Khare also worked on organic  
production in other settings,

310

00:15:23,700 --> 00:15:26,566  
including the atmospheres  
of the giant planets

311

00:15:26,566 --> 00:15:29,866  
and the surfaces  
of icy and rocky moons.

312

00:15:29,866 --> 00:15:32,466  
Khare also worked in the field  
of nanotechnology,

313

00:15:32,466 --> 00:15:35,866

producing in his laboratory  
samples of carbon nanotubes

314

00:15:35,866 --> 00:15:40,100

for analysis and experiments  
by himself and others.

315

00:15:40,100 --> 00:15:43,266

Bishun Khare was born  
in Varanasi, India.

316

00:15:43,266 --> 00:15:45,066

Khare earned  
his undergraduate degrees

317

00:15:45,066 --> 00:15:47,533

at Banaras Hindu University.

318

00:15:47,533 --> 00:15:50,733

Came to the U.S. and completed  
his doctorate in physics

319

00:15:50,733 --> 00:15:53,166

from Syracuse University.

320

00:15:53,166 --> 00:15:55,533

His formative work would be done  
with Carl Sagan

321

00:15:55,533 --> 00:15:58,766

at Cornell University  
over a 30-year span

322

00:15:58,766 --> 00:16:01,433

beginning in the 1960s.

323

00:16:01,433 --> 00:16:06,633

In 1996, Bishun contacted me and

inquired about the possibility

324

00:16:06,633 --> 00:16:08,833  
of moving to NASA Ames.

325

00:16:08,833 --> 00:16:11,900  
I of course encouraged him,  
and he came and established

326

00:16:11,900 --> 00:16:14,300  
a laboratory here,  
which he operated

327

00:16:14,300 --> 00:16:18,166  
until his death  
in August 2013.

328

00:16:18,166 --> 00:16:20,300  
It was a pleasure to work  
with Bishun.

329

00:16:20,300 --> 00:16:22,333  
He was enthusiastic  
about science

330

00:16:22,333 --> 00:16:24,600  
and listened carefully  
to everyone from students

331

00:16:24,600 --> 00:16:27,333  
to senior scientists, and he  
listened to what they said

332

00:16:27,333 --> 00:16:31,033  
and considered it equally  
regardless of the source.

333

00:16:31,033 --> 00:16:33,566  
He's missed.

334  
00:16:35,400 --> 00:16:41,400  
[music playing]

335  
00:16:46,100 --> 00:16:48,266  
- Growing up  
in Norman, Oklahoma,

336  
00:16:48,266 --> 00:16:50,600  
Tom Pierson studied  
aerospace engineering

337  
00:16:50,600 --> 00:16:54,333  
business and management  
at the University of Oklahoma.

338  
00:16:54,333 --> 00:16:56,833  
In the 1980s  
as a grants administrator

339  
00:16:56,833 --> 00:16:59,533  
at San Francisco State  
University,

340  
00:16:59,533 --> 00:17:01,433  
Tom helped  
Professor Charles Seeger

341  
00:17:01,433 --> 00:17:04,500  
obtain research funds  
for a new SETI project

342  
00:17:04,500 --> 00:17:07,866  
at NASA's Ames Research Center.

343  
00:17:07,866 --> 00:17:11,133  
Intrigued, Tom proposed a more  
efficient way to organize

344  
00:17:11,133 --> 00:17:13,900

NASA's SETI program through  
a nonprofit,

345

00:17:13,900 --> 00:17:17,866  
and the SETI Institute became  
a reality.

346

00:17:17,866 --> 00:17:20,800  
In 1984, Tom Pierson began  
his long career

347

00:17:20,800 --> 00:17:25,400  
as the Institute's  
Chief Executive Officer.

348

00:17:25,400 --> 00:17:27,266  
While founded  
to conduct SETI searches,

349

00:17:27,266 --> 00:17:29,200  
the Institute soon broadened  
its mandate

350

00:17:29,200 --> 00:17:32,000  
to encompass all aspects  
of understanding the nature

351

00:17:32,000 --> 00:17:34,766  
and prevalence  
of life beyond Earth.

352

00:17:34,766 --> 00:17:36,933  
Though not a scientist,  
Tom was as fervent

353

00:17:36,933 --> 00:17:39,300  
about the Institute's  
varied research agenda

354

00:17:39,300 --> 00:17:41,900

as any of its investigators.

355

00:17:41,900 --> 00:17:44,400

He would exuberantly convey  
the excitement of SETI

356

00:17:44,400 --> 00:17:46,533

and astrobiology  
at any gathering,

357

00:17:46,533 --> 00:17:50,800

professional or amateur,  
formal or casual.

358

00:17:50,800 --> 00:17:52,666

His management style  
was characterized

359

00:17:52,666 --> 00:17:56,300

by a fierce loyalty  
to the Institute's employees

360

00:17:56,300 --> 00:18:00,800

and an easy willingness  
to let them try new ideas.

361

00:18:00,800 --> 00:18:04,066

During his tenure,  
Tom led more than \$250 million

362

00:18:04,066 --> 00:18:07,666

of federally funded research  
and raised more than \$90 million

363

00:18:07,666 --> 00:18:11,133

in private funding  
for SETI research.

364

00:18:11,133 --> 00:18:12,966

For distinguished service

to NASA

365

00:18:12,966 --> 00:18:15,500  
and the scientific community  
and for supporting

366

00:18:15,500 --> 00:18:18,366  
basic research and education  
dealing with life

367

00:18:18,366 --> 00:18:20,266  
in the universe,  
he was honored

368

00:18:20,266 --> 00:18:24,833  
with NASA's Distinguished  
Public Service Medal.

369

00:18:24,833 --> 00:18:27,333  
Tom was a leader and a friend  
to many.

370

00:18:27,333 --> 00:18:30,200  
He was an athlete  
and a dedicated family man

371

00:18:30,200 --> 00:18:32,866  
who played competitive golf  
in college,

372

00:18:32,866 --> 00:18:35,933  
loved baseball and football, and  
shared his passion for sports

373

00:18:35,933 --> 00:18:40,800  
with his son Tommy, daughter  
Elizabeth, and wife Elyse.

374

00:18:40,800 --> 00:18:42,866  
Tom is remembered

as enthusiastic,

375

00:18:42,866 --> 00:18:44,600

generous, and fair.

376

00:18:44,600 --> 00:18:47,700

He dedicated himself  
and his career to what he called

377

00:18:47,700 --> 00:18:50,666

the most profound search  
in human history:

378

00:18:50,666 --> 00:18:54,433

To know our beginnings  
and our place among the stars.

379

00:18:54,433 --> 00:18:56,900

Tom is deeply missed.

380

00:19:01,200 --> 00:19:07,200

[music playing]

381

00:19:11,600 --> 00:19:15,100

- Colin pioneered many studies  
on meteorites that advanced

382

00:19:15,100 --> 00:19:17,866

our understanding  
of how the Solar System formed

383

00:19:17,866 --> 00:19:20,333

and the geological  
and geochemical evolution

384

00:19:20,333 --> 00:19:22,733

of planetary bodies.

385

00:19:22,733 --> 00:19:24,966

Colin was always  
a determined person

386  
00:19:24,966 --> 00:19:27,200  
and after moving  
to the Open University

387  
00:19:27,200 --> 00:19:31,466  
where he made Professor  
of Planetary Sciences in 1991,

388  
00:19:31,466 --> 00:19:35,133  
he rapidly built up expertise  
not just in the scientific study

389  
00:19:35,133 --> 00:19:38,266  
of meteoritics,  
but also in instrumentation

390  
00:19:38,266 --> 00:19:41,400  
for examining organics  
on other planetary bodies

391  
00:19:41,400 --> 00:19:44,133  
such as mass spectrometry.

392  
00:19:44,133 --> 00:19:45,800  
These instruments would  
eventually fly

393  
00:19:45,800 --> 00:19:48,533  
to other planets and comets.

394  
00:19:48,533 --> 00:19:50,433  
With his signature sideburns,

395  
00:19:50,433 --> 00:19:52,766  
his west country accent,  
and flair,

396

00:19:52,766 --> 00:19:54,766

Colin was always a formidable

397

00:19:54,766 --> 00:19:58,033

and influential force  
in science.

398

00:19:58,033 --> 00:20:01,366

Colin's largest scale  
contribution to astrobiology

399

00:20:01,366 --> 00:20:04,400

was the implementation  
of the "Beagle 2" lander--

400

00:20:04,400 --> 00:20:07,633

a lander designed to search  
for organics on Mars,

401

00:20:07,633 --> 00:20:10,133

measure their  
isotopic composition,

402

00:20:10,133 --> 00:20:13,300

and investigate the geology  
of the red planet.

403

00:20:13,300 --> 00:20:15,033

"Beagle 2,"  
which was launched

404

00:20:15,033 --> 00:20:17,566

with the European Mars Express  
mission,

405

00:20:17,566 --> 00:20:20,666

is thought to have successfully  
touched down on Mars,

406

00:20:20,666 --> 00:20:22,866  
but it never made contact.

407  
00:20:22,866 --> 00:20:26,266  
Colin's enthusiastic personality  
and love of science

408  
00:20:26,266 --> 00:20:28,633  
did more than launch  
a spaceship.

409  
00:20:28,633 --> 00:20:31,733  
He was also instrumental  
in inspiring many people

410  
00:20:31,733 --> 00:20:35,433  
to go into science  
and in encouraging astrobiology

411  
00:20:35,433 --> 00:20:39,166  
and related areas of activity  
in the UK.

412  
00:20:39,166 --> 00:20:41,533  
The "Beagle 2" mission  
was highly influential

413  
00:20:41,533 --> 00:20:44,400  
in improving public  
understanding of space missions,

414  
00:20:44,400 --> 00:20:48,166  
planetary science and science  
in general in the UK,

415  
00:20:48,166 --> 00:20:50,566  
and did much  
to bring planetary sciences

416  
00:20:50,566 --> 00:20:53,200

into the forefront of science.

417

00:20:55,900 --> 00:21:01,966

[music playing]

418

00:21:06,733 --> 00:21:09,433

- The field of geomicrobiology  
lost a treasured

419

00:21:09,433 --> 00:21:12,100

and vibrant leader,  
champion, and friend

420

00:21:12,100 --> 00:21:16,966

on October 26, 2014, with the  
passing of Katrina Edwards.

421

00:21:16,966 --> 00:21:19,533

Arguably the first person  
to attain a PhD

422

00:21:19,533 --> 00:21:22,666

in the field of geomicrobiology  
in 1999

423

00:21:22,666 --> 00:21:24,633

from the University  
of Wisconsin,

424

00:21:24,633 --> 00:21:25,866

Katrina was well known

425

00:21:25,866 --> 00:21:28,800

for her trailblazing abilities  
and attitude.

426

00:21:28,800 --> 00:21:30,633

Going straight from her PhD  
to the rank

427

00:21:30,633 --> 00:21:33,700  
of Assistant Scientist at Woods  
Hole Oceanographic Institution

428

00:21:33,700 --> 00:21:36,366  
was remarkable enough,  
made more so by the fact

429

00:21:36,366 --> 00:21:39,533  
that she had no oceanography  
experience at the time.

430

00:21:39,533 --> 00:21:41,933  
Not one to be deterred  
by such challenges,

431

00:21:41,933 --> 00:21:45,000  
Katrina quickly established  
herself as a major player

432

00:21:45,000 --> 00:21:47,600  
in deep-sea research  
at hydrothermal vents,

433

00:21:47,600 --> 00:21:50,900  
studying how microbes interact  
with oceanic crust.

434

00:21:50,900 --> 00:21:53,100  
She did this while  
simultaneously growing

435

00:21:53,100 --> 00:21:56,300  
her family to include  
three young girls.

436

00:21:56,300 --> 00:21:58,200  
Transitioning  
to dual professorships

437  
00:21:58,200 --> 00:22:00,200  
in Biological and Earth Sciences

438  
00:22:00,200 --> 00:22:03,666  
at the University  
of Southern California in 2006,

439  
00:22:03,666 --> 00:22:06,533  
Katrina went on to establish  
a \$25 million

440  
00:22:06,533 --> 00:22:08,233  
Science and Technology Center

441  
00:22:08,233 --> 00:22:11,200  
devoted to deep biosphere  
research in 2010,

442  
00:22:11,200 --> 00:22:13,133  
and to be co-chief  
of an international

443  
00:22:13,133 --> 00:22:16,000  
ocean drilling expedition  
in 2011.

444  
00:22:16,000 --> 00:22:18,033  
Katrina was recognized  
for her contributions

445  
00:22:18,033 --> 00:22:20,600  
to scientific discovery  
with many awards,

446  
00:22:20,600 --> 00:22:23,300  
including the A.G. Huntsman  
Award for Excellence

447  
00:22:23,300 --> 00:22:25,933

in Marine Science in 2012.

448

00:22:25,933 --> 00:22:28,866

Katrina will be remembered  
fondly by her close colleagues

449

00:22:28,866 --> 00:22:31,566

by her "get shit done" motto,  
always said

450

00:22:31,566 --> 00:22:34,500

with a playful smile and laugh,  
and her spirit will live on

451

00:22:34,500 --> 00:22:37,833

in the next generation  
of intraterrestrial researchers

452

00:22:37,833 --> 00:22:40,766

hunting for microbes  
that rust the crust.

453

00:22:44,200 --> 00:22:50,200

[music playing]

454

00:22:54,600 --> 00:22:57,166

- Martin Brasier was  
a leading paleobiologist

455

00:22:57,166 --> 00:23:00,500

from Oxford University,  
well known internationally

456

00:23:00,500 --> 00:23:03,700

for contributing to debates that  
influenced our understanding

457

00:23:03,700 --> 00:23:07,566

of the early biosphere  
at key points in Earth history.

458

00:23:07,566 --> 00:23:10,533

He was a recipient of the Geological Society of London's

459

00:23:10,533 --> 00:23:12,700

prestigious Lyell award.

460

00:23:12,700 --> 00:23:15,000

During a more than 45-year career,

461

00:23:15,000 --> 00:23:17,366

Martin covered the entire geological time scale

462

00:23:17,366 --> 00:23:20,566

and all continents except Antarctica.

463

00:23:20,566 --> 00:23:23,833

For the last 15 years he focused on the origins of early life

464

00:23:23,833 --> 00:23:26,433

during the Archaean and the subsequent "boring billion"

465

00:23:26,433 --> 00:23:28,233

of the Proterozoic.

466

00:23:28,233 --> 00:23:31,000

Martin relished collaborating and contributing as a member

467

00:23:31,000 --> 00:23:33,866

of the scientific community that teased out of rocks

468

00:23:33,866 --> 00:23:36,200  
the complex story of life.

469

00:23:36,200 --> 00:23:38,200  
He recognized early on  
the necessity

470

00:23:38,200 --> 00:23:41,133  
of multi-disciplinarity  
in addressing questions raised

471

00:23:41,133 --> 00:23:43,266  
through field mapping,  
microbiology,

472

00:23:43,266 --> 00:23:45,466  
and geochemical analysis.

473

00:23:45,466 --> 00:23:48,800  
He was never afraid to enlist  
the help of other experts.

474

00:23:48,800 --> 00:23:51,766  
He frequently referred to the  
Archaean early biosphere studies

475

00:23:51,766 --> 00:23:54,366  
as his most satisfying  
research project,

476

00:23:54,366 --> 00:23:56,766  
and his approach yielded  
a high scientific return

477

00:23:56,766 --> 00:23:59,233  
in publications,  
the chronology of which

478

00:23:59,233 --> 00:24:01,633  
reveal his changing position

on the timing

479

00:24:01,633 --> 00:24:05,133

of the first life  
on planet Earth.

480

00:24:05,133 --> 00:24:07,166

Martin was also an accomplished  
piano player,

481

00:24:07,166 --> 00:24:09,633

enjoying jazz,  
and had the practical skills

482

00:24:09,633 --> 00:24:12,066

to restore and build  
his own keyboard.

483

00:24:12,066 --> 00:24:14,100

In his later years  
he discovered an interest

484

00:24:14,100 --> 00:24:16,933

in historical microscopes,  
and began assembling

485

00:24:16,933 --> 00:24:19,433

an impressive collection  
including one

486

00:24:19,433 --> 00:24:22,466

that had belonged to the  
American micropaleontologist

487

00:24:22,466 --> 00:24:24,366

Joseph Cushman.

488

00:24:24,366 --> 00:24:26,400

A new generation of students  
can appreciate

489

00:24:26,400 --> 00:24:28,000

Martin's ability  
for storytelling

490

00:24:28,000 --> 00:24:29,633

through his popular  
science books

491

00:24:29,633 --> 00:24:32,333

"Darwin's Lost World"  
and "Secret Chambers"

492

00:24:32,333 --> 00:24:34,300

that will bring  
the Precambrian to life

493

00:24:34,300 --> 00:24:36,633

for a new and diverse audience.

494

00:24:36,633 --> 00:24:39,100

Martin tragically died  
in a car accident

495

00:24:39,100 --> 00:24:41,533

not far from his home  
in Eynsham, Oxfordshire,

496

00:24:41,533 --> 00:24:45,000

on the 16th of December, 2014.

497

00:24:45,000 --> 00:24:47,466

Thoughts and sympathy go out  
to his wife Cecilia

498

00:24:47,466 --> 00:24:49,500

who is thankfully recovering  
from her injuries

499

00:24:49,500 --> 00:24:52,100  
sustained in the accident,  
children Matthew,

500  
00:24:52,100 --> 00:24:55,100  
Alexander, and Zoe,  
and two grandchildren.

501  
00:24:55,100 --> 00:24:57,200  
Fortunately, he has left us  
with a rich

502  
00:24:57,200 --> 00:25:00,066  
and wide ranging  
scientific legacy.

503  
00:25:03,833 --> 00:25:09,833  
[music playing]

504  
00:25:14,233 --> 00:25:18,233  
- Alberto was a polar researcher  
who spent many summers

505  
00:25:18,233 --> 00:25:21,633  
on the Greenland Ice Sheet  
and Antarctica.

506  
00:25:21,633 --> 00:25:25,766  
Alberto was a professor  
at Arizona State University

507  
00:25:25,766 --> 00:25:28,433  
and ran the school's  
Extreme Environments

508  
00:25:28,433 --> 00:25:31,700  
Robotic and Instrumentation  
Laboratory.

509  
00:25:31,700 --> 00:25:34,533

Alberto was an investigation  
scientist for instruments

510  
00:25:34,533 --> 00:25:38,366  
on the "Curiosity" rover  
and "Mars Odyssey" orbiter.

511  
00:25:38,366 --> 00:25:43,533  
But for me Alberto  
was just my crazy friend.

512  
00:25:43,533 --> 00:25:46,900  
Alberto and I first met when we  
both started working

513  
00:25:46,900 --> 00:25:49,200  
for NASA's Jet Propulsion  
Laboratory

514  
00:25:49,200 --> 00:25:51,500  
in Pasadena, California.

515  
00:25:51,500 --> 00:25:53,933  
Alberto and I became colleagues,  
friends,

516  
00:25:53,933 --> 00:25:56,433  
and eventually roommates.

517  
00:25:56,433 --> 00:26:01,000  
Alberto was a meticulous, crazy  
fun guy who changed my life.

518  
00:26:01,000 --> 00:26:03,633  
Alberto loved leadership books.

519  
00:26:03,633 --> 00:26:08,166  
Alberto introduced me to  
the books "First Things First"

520

00:26:08,166 --> 00:26:11,066

and "How To Be  
A Lifelong Learner."

521

00:26:11,066 --> 00:26:14,200

Alberto always had big plans  
and he was able

522

00:26:14,200 --> 00:26:19,400

to accomplish those plans  
by putting first things first.

523

00:26:19,400 --> 00:26:22,033

Alberto was always an explorer.

524

00:26:22,033 --> 00:26:26,000

While a graduate student at USC  
his 10x8-foot

525

00:26:26,000 --> 00:26:30,233

home/cubicle/studying/living  
space/lab/room

526

00:26:30,233 --> 00:26:33,333

was Spartan-like and had  
a world map on the wall.

527

00:26:33,333 --> 00:26:36,500

And even though he was only  
25 years old,

528

00:26:36,500 --> 00:26:40,400

Alberto had stick pins all over  
Asia and Europe,

529

00:26:40,400 --> 00:26:43,066

the Middle East,  
North and South America

530

00:26:43,066 --> 00:26:45,133  
on that world map.

531  
00:26:45,133 --> 00:26:48,066  
I do not remember any marks  
in Africa or Antarctica,

532  
00:26:48,066 --> 00:26:50,766  
but those flags  
would soon be planted.

533  
00:26:50,766 --> 00:26:53,300  
Alberto has always been eager  
to meet new people,

534  
00:26:53,300 --> 00:26:57,366  
explore new lands,  
and imagine new ideas.

535  
00:26:57,366 --> 00:26:59,100  
One of his not-so-great ideas

536  
00:26:59,100 --> 00:27:01,933  
was taking in a dog  
named Genghis.

537  
00:27:01,933 --> 00:27:04,833  
He loved Genghis,  
even when Genghis ripped up

538  
00:27:04,833 --> 00:27:07,366  
all the carpet  
in our living room.

539  
00:27:07,366 --> 00:27:10,633  
His most infamous idea was  
to drop rubber ducks

540  
00:27:10,633 --> 00:27:14,566  
into a natural drain hole

on the Greenland Ice Sheet

541

00:27:14,566 --> 00:27:17,166  
to determine if meltwater  
from the surface

542

00:27:17,166 --> 00:27:19,733  
reached the sea.

543

00:27:19,733 --> 00:27:25,000  
His best idea by far  
was to marry his wife Mary

544

00:27:25,000 --> 00:27:29,100  
and create three beautiful,  
smart, wonderful children,

545

00:27:29,100 --> 00:27:32,800  
Indra, Isis, and Athena.

546

00:27:32,800 --> 00:27:35,566  
Alberto was passionate  
in all that he did.

547

00:27:35,566 --> 00:27:38,166  
When Alberto was training  
for a running race

548

00:27:38,166 --> 00:27:40,800  
or a triathlon,  
everything in the refrigerator

549

00:27:40,800 --> 00:27:42,566  
turned into fat-free.

550

00:27:42,566 --> 00:27:46,066  
Fat-free butter, fat-free milk,  
fat-free salad dressing,

551

00:27:46,066 --> 00:27:50,133

fat-free wine,  
fat-free lollipops,

552

00:27:50,133 --> 00:27:53,066

fat-free popsicles.

553

00:27:53,066 --> 00:27:56,133

Alberto's smile opened up  
lots of doors for him,

554

00:27:56,133 --> 00:28:00,300

and his good humor and passion  
for life kept those doors open

555

00:28:00,300 --> 00:28:03,200

because so much good  
was flowing through.

556

00:28:03,200 --> 00:28:06,300

Every time I visited Alberto  
with Mary

557

00:28:06,300 --> 00:28:09,433

and Indra and Isis and Athena,

558

00:28:09,433 --> 00:28:12,933

I saw such a magnified  
outpouring of love.

559

00:28:12,933 --> 00:28:15,533

I am sad and I miss you,  
my brother.

560

00:28:15,533 --> 00:28:17,433

I will never forget  
your kindness,

561

00:28:17,433 --> 00:28:19,933

your ideas, and your smile.

