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RICHARD BACKUS ORAL HISTORY

October 21, 29 and November 12, 24, 2003 Interview by Frank Taylor

Tape 1 of 4 tapes

Woods Hole Oceanographic Institution

- 1 TAYLOR: [Tests equipment.]
- 2 BACKUS: Well, I don't know. It remains to be seen how good it is. [They laugh.]
- 3 TAYLOR: We are at the Woods Hole Oceanographic Institution in the McLean Laboratory,
- 4 down in the Archives, to talk with Dr. Richard Backus about his career in the Woods Hole
- 5 Oceanographic Institution. And Dick Backus is a biologist that started out in what I think of as
- 6 the Golden Years of oceanography, when there were so many new kinds of changes and so much
- 7 excitement, and the whole idea of interdisciplinary science came into being, where you looked at
- 8 whole areas. And originally I think his first interest was in, what? The top thousand? As far as
- 9 sea life was concerned? But this just expanded and expanded, and one of the things I'm going to
- 10 talk to him about is how he got mixed up with the physical oceanographers and things like this.
- 11 So I think it's going to be interesting. Just to start off with, could you tell me a little bit about
- 12 when and where you were born?
- 13 BACKUS: Yeah, I was born in a hospital in Rochester, New York. My folks lived on a
- 14 They'd just bought, a couple years prior to my birth, a worn-out farm in the town of Webster,
- 15 which is now just a suburb of Rochester, but was still an interesting farm town. I was born in
- 16 1992. My father was a lawyer and had law offices with his brother in the city--in Rochester, that
- 17 is--and all his friends and family thought he and my mother were crazy to buy this farm way the
- 18 hell and gone [Telephone rings.] out in the countryside. [Sounds of phone being answered.]
- 19 'Cause it was a 10-mile commute in a Model T Ford over bad roads and bad tires, and all those
- 20 things.

21 TAYLOR: Lots of weather up in that area.

22 BACKUS: Yeah, and goodly winter pretty rugged winter weather. Anyhow, so I grew up
23 there with Mother and Father, and my maternal grandparents. And I was followed by a couple of
24 sisters. But it was a wonderful place to grow up out there in the country. Now it's just suburbia,
25 but then it was farms and forest and I grew up interested in the natural world, and was
26 encouraged in that by my mother and father.

27 TAYLOR: What was Dad's name?

28 BACKUS: His name was Sidney Kinney[SP?] Backus, and she was--before she was married--
29 Ruth Bown Haven[SP?]. They're both WASPy names. She was born in Connecticut. He was
30 born in Rome, New York, and they both traced their ancestry back to early New England days,
31 early in the 17th century. So that's what they were all about. My mother was a social worker,
32 was active in the Planned Parenthood Organization, was director of the Monroe County League
33 for Planned Parenthood, known as the birth control by the folks that used it.

34 TAYLOR: In those early years?

35 BACKUS: In those early years, right. There was always the joke that The Unitarian
36 Church in Rochester was the place where the first birth-control clinic was, and the joke--and I'm
37 not sure whether it was really a joke or a fact--that the pool table in the basement was the first
38 examining table. [They laugh.] Anyhow, that's what she did.

39 TAYLOR: Now that's interesting, because that's really kind out on the edge for the period of
40 time, and for the location where you were living. That's pretty conservative area.

41 BACKUS: Right, right. She took a lot of heat from the church and others because of her
42 activities. She was really devoted to it, and she was good. She was a tough cookie in a nice
43 way.

44 TAYLOR: But you know, it's interesting that there must have been more of that kind of early
45 strong women in that area, because it's not very far up the road that they have the hall of fame
46 for women activists.

47 BACKUS: Right, I think Seneca Falls, which is not all that far from Rochester, has some sort of
48 museum. Maybe that's where uh, what's her name, one of the great prohibitionists and women's
49 right women came from. Sorry, I lost it.

50 TAYLOR: It'll come back to you.

51 BACKUS: Doesn't matter.

52 TAYLOR: What was Rochester like then? You know, now it truly is a scientific community. I
53 mean, you've got Kodak, you've got Bausch and Lomb that are all there.

54 BACKUS: Yeah. It's been on hard times lately. I was there a couple of years ago with my
55 sister, and we walked around downtown on a Saturday morning. It was absolutely abandoned. I
56 mean, all the people that worked there were off because it was Saturday, but there was no
57 Saturday activity in the downtown, which was barren.

58 TAYLOR: That was a pretty big thing when you were a kid, wasn't it, the Saturdays downtown.

59 BACKUS: Oh, well, sure, it was a vibrant, going affair, and of course the principle shops were
60 located on Main Street and adjacent streets, and now they've all moved to malls on the edges.
61 The Genessee River runs right through the town, and one thing that's different about the town
62 now is that a lot of the Main Street went right over the Genessee River on a bridge that you
63 didn't know was a bridge because the buildings on either side of the street obscured the river, so
64 the river ran right under the principal shopping areas of the city. Now, with the shopping areas
65 moved away, a lot of those old buildings have been knocked down, so when you go across the
66 river you see the river, which is spectacular, with waterfalls right there in the town. And of
67 course the waterfalls and the power they provided were what caused the growth of the city where
68 it grew.

69 TAYLOR: Well, you know, if you mention "New York" to most people that are going to be
70 listening to this, they're going to be thinking of New York City, and they don't realize that part
71 of New York State, from the Genessee on over--Chenango Valley--is an incredibly beautiful area.

72 BACKUS: Well, it's great. The old farm that I grew up on was half a mile from the shores of
73 Lake Ontario, so Lake Ontario was where I learned to swim. It was a beautiful country to grow
74 up in. But the city, like many of those upstate New York cities is on hard times, in spite of the
75 fact of Eastman Kodak and Bausch and Lomb and Xerox and others are still there. The
76 community is on hard time, and I don't understand why.

77 TAYLOR: Well, I heard just last week that Kodak is going to cut their black-and-white film
78 production in half, and that's going to cause them to lay off some 13,000 people around It's
79 a tough area. I'm familiar with it only because my daughter went to Colgate, which is not too far
80 away from that particular area. Growing up on a farm: what was a day like for you as a kid,
81 growing up on the farm?

82 BACKUS: Well, it was an abandoned farm. It was 20 acres. It was pretty well worn out by the
83 time my folks bought it, but, when they bought it, it came with a great big New York State barn
84 and a horse, a cow, pigs, chickens, all of that. They didn't keep the horse for too long, although I
85 remember it. We had a cow, always had a cow for the first 10 or 12 years of my life, I suppose.
86 My grandfather Haven[SP?], who lived with us, was the cow keeper.

87 TAYLOR: Did you learn to milk it yourself?

88 BACKUS: I never learned to milk, which is regrettable, but somehow he never taught me. We
89 finally lost the cow because the cow was supposed to be pregnant but wasn't and when my
90 grandfather tried to dry her up, as you do when the cow is with calf and she wasn't pregnant,
91 screwed up her milk apparatus, so we lost that cow and didn't get a replacement. But I'll tell you
92 it was a Guernsey cow and it gave lots of fat milk, and I drank a quart a meal when I was a boy.

93 TAYLOR: Unpasteurized.

94 BACKUS: Oh, yes, unpasteurized. The cow was tuberculin tested every year, but it was raw
95 milk, and it was good. I had an aunt that lived in the city, and once in a while I went in there and
96 drank milk at her house which was pasteurized, and it didn't taste good.

97 TAYLOR: It's almost blue in color. I know what you're talking about. Were any crops raised
98 on these acres.

99 BACKUS: We had big gardens. We had a huge vegetable garden. My father--one of his
100 principal, if not his principal recreation, was vegetable gardening. So we had a big vegetable
101 garden. We had fruit trees of all kinds. That strip of land along Lake Ontario, where the climate
102 is moderated by the lake, is great fruit-growing country. Actually, our house was in the middle
103 of an apple orchard--big old trees, but we had apples, pears, peaches, sour cherries, sweet
104 cherries, quinces, just about everything. That was good. As I saw, he kept a big vegetable
105 garden, and he and my mother were flower gardeners too, so I kind of grew up thinking that was
106 important and still do.

107 TAYLOR: Now did they sell a lot of that food and fruit, or did your mom preserve a lot of it?

108 BACKUS: We didn't sell much, no. Maybe bartered a little, but didn't sell anything much.
109 Preserved a huge amount. We had a big old preserve cellar with big, deep shelves and canned a
110 lot peaches, pears, cherries for winter dessert. Lots of tomatoes from the vegetable garden. All
111 sort of things. Then pickles, jams, jellies, water-glass eggs preserved in the summer when the

112 chickens were laying a lot, used for cooking in the winter when they weren't laying much.

113 Apples, of course, bushels and bushels of winter keepers.

114 TAYLOR: These are things you'd store in a barrel in a root cellar, or something like that?

115 BACKUS: Yes, right. The apples in bushel baskets, generally. All that stuff was in the cellar.

116 TAYLOR: You had some siblings?

117 BACKUS: Two sisters, one less than two years younger, and the other about 10 years younger.

118 They turned out well.

119 TAYLOR: What were their names and what did they turn out doing?

120 BACKUS: The one that was just a little younger than I, name was Priscilla. She married a man
121 named Welsh and lived in Burlington, Vermont. She was responsible for starting Planned
122 Parenthood of Vermont, which is now Planned Parenthood of Northern New England. She was
123 the founder of that. She had an adopted son who was mentally ill and was appalled at treatment,
124 or lack thereof, of mentally-ill people in Vermont, and she started the Vermont chapter of AMI,
125 which is Alliance for the Mentally Ill. She was a lobbyist in the state legislature in Montpelier,
126 and she was a winner.

127 TAYLOR: Mom had a real influence on her, uh.

128 BACKUS: Yeah, right. She's dead now. She died suddenly of a cerebral aneurysm. My other
129 sister is 10 years younger, lives in Concord, Massachusetts, married to a retired physician, and
130 she was a housewife, raised three boys. Was a big contributor to municipal life in Concord.

131 TAYLOR: So that's interesting. You mentioned that your mom was very much activist in this
132 line. How about your dad. Was he very supportive and working in those areas also?

133 BACKUS: Yeah, he was a big supporter of He was a kind of a macho guy in certain
134 respects, but he was always a big supporter for womankind. He had a great respect and
135 admiration for women. He was the supervisor of A supervisor in New York State is the
136 same I guess as chairman of the board of selectmen combined with the executive officer of the
137 town. Anyhow, it's the principal officer of the town in New York State. So that's an elective
138 position. He was Mr. Republican in our town and was elected supervisor and served a number of
139 years as supervisor. And before that as justice of the peace. So we had some pretty exciting
140 times in our living room at home sometimes when a deputy sheriff or a cop would show up with
141 some malefactor. He also performed weddings in our living room, and that sort of thing.

142 TAYLOR: So you basically, then, came from a family where community service and activism
143 was a real important issue.

144 BACKUS: Right. They were terrific, and my sisters have been terrific, and I always feel that
145 I've been sort of a slacker in that regard. I never contributed very much to the community at
146 large.

147 TAYLOR: You took a slightly different road. You're living on the outskirts of Rochester.
148 Roads were touch then. I can remember in those years, if you drove 40 miles an hour you were a
149 real speed demon. How about school. How did you get into school? Where did you go to
150 school?

151 BACKUS: Webster District No. 4 school was right across the road from our house. So when I
152 started school in (when would it be?) 1928 or '29, all I had to do was run across the road to this .
153 . . . It wasn't quite a one-room schoolhouse. It was a one-room in the front that had grades 4
154 through 8, and then a littler room behind that had grades 1 through 3.

155 TAYLOR: All at the same time?

156 BACKUS: Yeah.

157 TAYLOR: And how many teachers were there?

158 BACKUS: One for each room.

159 TAYLOR: So you had two teachers that were responsible for first grade up through eighth
160 grade.

161 BACKUS: That's right, yeah. And that was pretty interesting. I mean, I think they did
162 amazingly well. If you paid attention, and if you were sort of minimally equipped, why you
163 learned to read and write and add and subtract and multiply and divide, and quite a bit else. So I
164 remember enjoying that school quite a bit.

165 TAYLOR: Would the older kids sometimes help the younger kids?

166 BACKUS: Well, yeah, not directly perhaps. But there was a long bench up in the front of the
167 room, and the grade that was reciting or whatever would go up and sit on that bench, while the
168 others that were still at their desks would go about their business. But if you were pretty well
169 caught up you could pay attention to what was going on up in the front of the room, so it would
170 be review if it were the grade below you that was up there, or a little preview if the grade that
171 was up there was the grade ahead of you. So actually such a system as that has some advantages,
172 it seems to me.

173 TAYLOR: So if you had some intellectual curiosity you could really solidify a base and still
174 grow some.

175 BACKUS: Yeah, I think it was a Maybe it's just the warmth of looking back 70 or more
176 years, but I think it was not a bad system. So there were only maybe 30 kids or so in the whole
177 school. Then of course the population of the town began to grow, and pretty soon the school
178 wasn't big enough to handle grades 1 through 8, so the top three grades--maybe 6, 7 and 8--got
179 shipped off to the central school on a really old, broken-down school bus. We always felt like
180 crumbs riding the school bus, because all the school districts that went to the central school
181 always made fun of our bus, which they called the "cigar box." [They laugh.]

182 TAYLOR: Was it tough having your teachers right across from your parents?

183 BACKUS: No. I was not the best behaved of students, but my parents pretty much got their
184 nose out of my schooling, I thought. When I was in grades 7 and 8 in the Central School in
185 Webster I was getting in quite a bit of trouble, but that never leaked home. I mean, I got bad
186 marks on department on my report card, but colorful stuff never got home. But when I was
187 about to start high school, which I would have continued at that school, the Webster Central
188 School, my father said, "It's outrageous they won't let you take Latin as a freshman!" And I
189 think this was just cover. I think they knew that I was not making the most of my opportunity, so
190 they sent me off to a private school in Rochester, the Harley[SP?] School, which

191 TAYLOR: Was this a boarding school?

192 BACKUS: No, it was a so-called "country day school." Falmouth Academy reminds me a lot of
193 this school that I went to for four years, a wonderful school. I really buckled down and made the
194 most of the opportunity there. It was a great school, with wonderful teachers. As I saw, it had
195 much of the flavor of the Falmouth Academy, which always, it seems to me, has put the
196 emphasis on the right things.

197 TAYLOR: Well, what was the thing that triggered the interest in school when you got to high
198 school but wasn't there when you were in elementary and what we used to call "junior high
199 school."

200 BACKUS: I was mostly bored in the Webster Central School, so, like kids do that are bored,
201 they take up the slack by shooting paper wads at their buddies and we had little aluminum
202 blowpipes of spherical tapioca that just fit a blowpipe.

203 TAYLOR: Peashooters! One of the great things of my youth. I loved those! And those got me
204 in certain amounts of difficulty too.

205 BACKUS: So I got swatted quite a bit by knocked around quite a bit by the teachers, but
206 as I say, the colorful stuff never got home, but I think my parents, who weren't stupid, figured
207 things weren't going too well, so that's when they shipped me off to Harley School.

208 TAYLOR: I absolutely--for a guy that spent most of his life in education--I hated school, up
209 until the time I got to college. Now the only reason I got to college was that I was a good
210 football player.

211 BACKUS: [Laughs.]

212 TAYLOR: But I ran across a biology professor that I really liked and wanted to impress him
213 with the fact that I could do this kind of work, and that just made college an absolutely super
214 experience for me. It sounds kind of like you had the same sort of thing for high school.

215 BACKUS: Yeah. High school was absolutely wonderful. I graduated from the Harley School
216 in June of 1940, and I went off to Dartmouth College that fall. The Harley School had been such
217 a wonderful experience, that college actually was a letdown. It was just not the same.

218 TAYLOR: Can you put your finger on what was it that really got you excited about this Harley
219 School.

220 BACKUS: Well, it was I think, as you suggest in your experience, it was great teachers that
221 really turned the trick, that challenged you and helped you and really loaded the work. Yeah, it
222 was teachers, I guess.

223 TAYLOR: What were your favorite subjects? What were the things you liked to do the most?

224 BACKUS: I liked biology, which was kind of formalizing my interest in natural history of all
225 sorts, was a favorite, of course. But I also liked English and mathematics very much.

226 TAYLOR: I have mentioned this in several of the oral histories, as someone who taught
227 sciences all of their professional career, when I ask the scientists at the Institution that question,
228 originally I was a little shocked to hear things like "English, literature, arts," 'cause I was
229 expecting to hear "physics, chemistry," and so on. My wife, who was a social scientist I
230 remember going home and we were discussing it over dinner one night. I said, "Gee, was my 36
231 years of education wasted?" And she said, "No." She said, "The people you're dealing with at
232 the Woods Hole Oceanographic Institution are outstanding scientists, and outstanding scientists

233 are very creative people. And those are the creative subjects. I'm not the least bit surprised that
234 they're interested in something like English, or literature, or something like that."

235 BACKUS: Right, yeah.

236 TAYLOR: So what would you do for entertainment during the high-school years.

237 BACKUS: I had a buddy who was a farmer all his life. He and I were just a few months apart in
238 age. We each got a .22 rifle when we were 12 years old, and we spent a lot of time There
239 were certain things that we were allowed to shoot and certain things we couldn't. We could
240 shoot English sparrows and starlings and of course crows if we could get close enough to one,
241 which we couldn't, and woodchucks, and that sort of thing. So I spent hours and hours rambling
242 around in the woods and fields, basically. Never had a bicycle, didn't care. There weren't any
243 safe places to ride a bicycle.

244 TAYLOR: It's interesting: when you're hunting, was the interest in the gun, the shooting and
245 all that, or was the interest more in the environment that you were going to be working in?

246 BACKUS: I suppose it was the environment, although we didn't appreciate that particularly, but
247 we certainly liked shooting, certainly liked our guns.

248 TAYLOR: In your day and in my day, getting a BB gun and then a .22, a Red Ryder BB gun
249 and then a .22 was actually a rite of passage. That's what boys were expected to get in those
250 days.

251 BACKUS: Right, yeah. Well, I have a totally different attitude towards guns than I my wife
252 does, for instance, she tends to shrink from guns. I have a couple of grandsons who are in guns in
253 a big way, and I think she kind of is horrified of this, but guns don't have to be a bad thing. I
254 certainly enjoyed my .22.

255 TAYLOR: I still have my Marlin octagonal barrel, single-shot .22.

256 BACKUS: Right. Mine was a Remington. It was identical with my buddies. You could only
257 tell them apart by the serial number, which mine began with "1," and his long serial number
258 began with "2." So if we laid 'em down and got 'em mixed up, we could always tell 'em apart
259 by the serial number, but that was the only way.

260 TAYLOR: What was dinnertime conversation like at your house?

261 BACKUS: We always, invariably had dinner together as a family--seven of us: my parents,
262 grandparents and sisters and I. We even had breakfast together as a family, although my sister
263 Priscilla was always kind of late in coming down to breakfast, and my grandfather Haven[SP?]

264 tended to sleep in a little. But we always invariably ate dinner together, and I'm told that that's
265 not always the case these days, that families kind of eat on the fly, one person grabbing this, and
266 the other person grabbing that. But dinnertime was very important in our family, and dinnertime
267 conversation was important.

268 TAYLOR: And were the kids taken into the conversation?

269 BACKUS: Oh, sure. Yeah, of course, I don't remember many details of our conversations, but
270 we certainly had them. We sat around the dinner table quite a bit after the meal, and we used to
271 play that spelling game called "Ghost." And then, when radios came along, we must have been
272 the last house in our neighborhood to get a radio, but then my father decided that maybe radios
273 were here to stay after all, so [Laughingly.] we got a radio, a Stromberg Carlsen, which was a
274 Rochester firm that built radios and I suppose other electronics afterwards. Then he discovered
275 Lowell Thomas as an evening news broadcast, so then we began listening to Lowell Thomas as a
276 part of dinner also.

277 TAYLOR: Even though I could never remember any family conversations, but they were topical
278 kinds of conversations.

279 BACKUS: Yeah, I believe so. Hard to remember. Anyhow, my father became devoted to
280 Lowell Thomas and this evening news broadcast, and Lowell Thomas started out by saying,
281 "Good evening, everybody," and my father would say, "Good evening." And Lowell Thomas
282 was sponsored by Blue Sunoco, which you could see--in the partially transparent pumps you
283 could see this ocean-blue gasoline, which was dyed to be blue. So he wouldn't buy anything
284 else. One weekend we were down near Ithaca, New York, where Cornell University is, and the
285 hills go up from near the lake, very steeply just as the bottom of the lake goes down very steeply,
286 a very deep lake. Anyhow, we were way up above the lake on a road which sliced the hill sort of
287 diagonally, so there was probably two or three or four miles of downhill, down to the city, and
288 we ran out of gas. My father was always pretty lucky, and here we were on this long hill, so
289 anyhow we coasted down this hill. Pretty soon, up ahead, we saw a Texaco station. And my
290 father coasted right on by. My mother was horrified. "Sidney," she said, "why didn't you stop?"
291 He said, "It wasn't Blue Sunoco." So anyhow, he saw, on down the hill, another quarter of a
292 mile or so, another Blue Sunoco station coming up.

293 TAYLOR: You know, it's interesting, most people I don't think would think of New York State
294 as being particularly hilly. I'm a bicycling enthusiast, and if I lived in New York State I
295 wouldn't be a bicycling enthusiast. There's a lot of long, long hills in that area.

296 BACKUS: Lots of hills.

297 TAYLOR: But also, those cuts in those hills give you a wonderful picture of the geologic past of
298 that particular area, with the layering, and things like that.

299 BACKUS: Oh yes, yes. There are some wonderful cuts in the New York State Thruway that
300 must have delighted sedimentary geologists.

301 TAYLOR: Certainly delighted me for years. It was a given that you would be going to college.
302 Is that in your family?

303 BACKUS: Yeah, sure. My father went to Dartmouth College, and it was not only given that I
304 was going to go to college, it was given that I was going to go to Dartmouth College. But it was
305 never forced on me. I just grew up with an enthusiasm for that idea. It wasn't like some guys I
306 know, like my old friend Tom Lineweaver[SP?]. Tom was interested in going to college in
307 Arizona, and his father said, "You can go to college any place you like, but if you go to
308 Princeton I'll pay for it." [They laugh.]

309 TAYLOR: Again, this may be a thing of that particular period. I have relatives who the sons are
310 Dartmouth graduate, dad's a Dartmouth graduate, grandfather's a Dartmouth graduate, and great-
311 grandfather's a Dartmouth graduate. I mean, it's just through the family. And I had students like
312 that. It seemed to be a thing that was more generational. I don't think people think like that so
313 much any more.

314 BACKUS: Yeah, could be.

315 TAYLOR: So, that was where you were going go. "Big Green" out in Hanover.

316 BACKUS: Right. I went there from the fall of 1940 until the spring of 1942, and of course
317 World War II had cranked up, so in the summer of 1942 I enlisted in the Army Air Corps, so I
318 was gone from Dartmouth from 1942 to 1946, when I came back and finished at Dartmouth after
319 World War II.

320 TAYLOR: Let's take that kind of a step at a time. Going to Dartmouth was kind of a family
321 thing, essentially.

322 BACKUS: Yeah.

323 TAYLOR: What were you going to major in?

324 BACKUS: I thought I would probably major in botany, which I did indeed end up doing. That
325 was just because of my kind of wildflower interest as a kid. So that's why I was a botany major
326 at Dartmouth.

327 TAYLOR: Now that's kind of an interesting major for a guy that was interested in the general
328 world and all that. Usually a kid will pick some kind of zoological thing, you know, the animals.

329 BACKUS: Right, right.

330 TAYLOR: What was the interest from the botanical standpoint?

331 BACKUS: Just the fact that I was crazy about trees for one thing. I thought for a long time that
332 I'd be a forester when I grew up, so I was always crazy about trees and other plants as well. As I
333 say, I was a wildflower enthusiast. So botany seemed like a perfectly natural direction to go in.

334 TAYLOR: And in those days was botany kind of a taxonomic sort of thing?

335 BACKUS: It was a taxonomic evolutionary sort of thing. Right, taxonomy, plant evolution,
336 phytogeography, plant geography. Plant genetics was beginning to crank up some.

337 TAYLOR: But those were real early years for that.

338 BACKUS: Yes, right. And the genetics and molecular biology that's important now were not
339 much in those times.

340 TAYLOR: In that particular period OK, now you're working in a botanical thing. You've
341 got a different kind of species going around now in Dartmouth than you had out in the Rochester
342 area. Were you into going out into the woods and things like that when you . . . ?

343 BACKUS: Yeah, I was big in outdoor affairs at Dartmouth. I climbed a lot in the White
344 Mountains and walked a lot in the woods, camped a lot, fished quite a bit. Yeah, I was active in
345 Dartmouth Outing Club affairs.

346 TAYLOR: And Outing Club at Dartmouth was really kind of a big deal, wasn't it?

347 BACKUS: It was a big deal, right. The Dartmouth Outing Club. I guess every New England
348 college certainly now that has an outing club--a kind of a funny name, "Outing Club," actually,
349 but Dartmouth Outing Club was the first of the outing clubs, founded about the time that my
350 father was in Dartmouth, in the first decade of the 20th century. Yeah. So I was a big out-of-
351 door man.

352 TAYLOR: Now, after a year or two there, 'course Second World War, as you pointed out, had
353 really kicked in, as opposed to what a young person today might see of wars, this was essentially
354 a popular war. We believed we had to do this, and . . .

355 BACKUS: Right.

356 TAYLOR: . . . the country was behind it. And rather than wait to get drafted, you enlisted.

357 BACKUS: Yeah. The second semester of my sophomore year, which was the semester that
358 began shortly after Pearl Harbor, was kind of miserable. I flunked a couple of courses. I didn't
359 have my mind on I had my mind on the war, mind on something. I felt like I ought to be
360 doing something instead of just being a liberal-arts college student. So I ended up flunking a
361 couple of courses. That horrified my parents, of course. I ended up making up those courses
362 right away by going to the University of Rochester summer school. I took a course in
363 meteorology and a course in calculus at the U of R, but as soon as those courses were over, why I
364 enlisted in the Army Air Corps as an aviation cadet. So there was going to be a wait of some
365 months before I got called up to go to flying school. And it was, it was six months before I got
366 called to the classification center in Nashville. So for those six months I worked as a stock
367 chaser in the General Motors plant in Rochester, which was building a starter motor for an
368 aircraft engine that was being built elsewhere--oh, it was a starter motor and a gearbox that
369 cranked an aircraft engine. So I suppose that working in a factory was going to be kind of dull,
370 but actually it was pretty lively. I really enjoyed it. So a stock chaser is responsible for seeing--
371 insofar as he can--that his assembly line never runs out of parts. So I found that there was
372 several interesting possibilities for a stock chaser. Sounds kind of horrible now, but I even
373 stooped so low as to steal parts from other lines . . .

374 TAYLOR: To keep yours going.

375 BACKUS: . . . to keep our line going, which my boss knew I was doing and didn't tell me not
376 to. He was always pleased because our production schedule was right up to where it ought to be.
377 Other lines that were building generators and similar products to ours weren't doing so well. But
378 there were enough common parts between our line and especially the line that built a generator.
379 There were enough common parts so that if I couldn't borrow parts from the other line I stole
380 them. And I decided that maybe that's the road to success in the industrial world. [They laugh.]

381 TAYLOR: But you know, it's interesting, because during that period, there were all kinds of
382 posters and things like that that was to keep production high. You know, you would see pictures
383 of people rolling up their sleeves with a wrench in their hand, and all that.

384 BACKUS: Right.

385 TAYLOR: I mean, you had to keep the production going . . .

386 BACKUS: Right.

387 TAYLOR: . . . for the war effort.

388 BACKUS: Right. Well, I think that the production on the generator line went down as the
389 production on the starter motor [They laugh.] line went up, so I don't know how it balanced out
390 in the end. Anyhow, that was an interesting experience. So I worked there from sometime
391 towards the end of the summer of 1942 to February of 1943, when I went to the Air Corps
392 Classification Center in Nashville, Tennessee, which is where they decided were you capable of
393 being a pilot, navigator, bombardier, or were you not, and which of those three were you best
394 suited for. I'd always been fascinated by the idea of finding one's way by the stars, so I was
395 determined that I wanted to be a navigator from the start, so you were asked for your
396 preferences. Most people, of course, wanted to be pilots, but I wanted to be a navigator, and I
397 was sent to, after two or three weeks, or a month maybe in Nashville, sent off to navigation
398 school in Monroe, Louisiana, where I was for about nine months.

399 TAYLOR: Was that intense, that nine months? Was that a hard course?

400 BACKUS: Ohh, boy, that was rugged. That was harder than any college or graduate school that
401 I ever went to. 'Cause it was demanding work, but everybody was in a hurry, so there was no
402 time for nonsense.

403 TAYLOR: It was a real grow-up period for a lot of young men.

404 BACKUS: Really. It made me grow up. Yeah.

405 TAYLOR: So you became a navigator finally.

406 BACKUS: I became a navigator, then I trained on a B-24 crew out in the southwestern United
407 States. We bounced around to several stations out there: Tucson, Blythe, California, Clovis,
408 New Mexico. Then came east to Langley Field in Virginia. Then in February of 1944 we got
409 given a brand new B-24 and sent to England to join the 8th Air Force.

410 TAYLOR: That's a pretty legendary outfit in the Second World War.

411 BACKUS: Right. Right. Yeah, that was for real.

412 TAYLOR: What part of England did they send you to?

413 BACKUS: Well, the 8th Air Force was concentrated in the southeast of England, which made
414 the trip to Europe and back as short as possible.

415 TAYLOR: Was that your first time out of the United States.

416 BACKUS: Yes.

417 TAYLOR: So that was kind of an adventure, too.

418 BACKUS: Oh, yeah, big time. Yeah, going to Nashville, Tennessee, and then on to these other
419 placed in the States was a big adventure, because I'd never been west of Buffalo or south of
420 Manhattan. So it was all a big adventure. So I ended up in a heavy bombardment group, 453rd
421 Bomb Group in a place called Old Buckenham. There are a couple of other guys here in town
422 that were in the same bomb group. The experience in the 8th Air Force was rugged. If you got
423 through your first 10 missions, your chances were pretty good at getting through the rest of the
424 25 or however many, but practically all the casualties were with crews among that first 10
425 missions, and so we were a casualty on my fourth mission. Actually, the first mission I flew was
426 with a substitute navigator with another crew.

427 TAYLOR: That was, for lack of a better term, an extremely dramatic period in which what you
428 folks were doing was an extremely dramatic kind of encounter. We had massive amounts of
429 flack and things like that over there. Mission BACKUS: 4, the one that you were a casualty on--
430 could you take us through the whole mission? I mean, did you get nervous the day before, or
431 when you were taking off? Can you go through the whole experience.

432 BACKUS: Yeah. I suppose the first one and the fourth one are the most interesting. You get up
433 at 3, 3:30 in the morning, eat some breakfast. Sure, you're nervous, at least I was, especially on
434 the first one. The sick navigator that I was substituting for on this first one, he was saying, "Oh,
435 this is going to be an easy one, no sweat." Actually it turned out it was the worst mission that the
436 group had flown. I think the group had flown a couple of dozen missions, and they'd lost more
437 aircraft on this first one for me than they had at any other mission that they'd flown, so instead of
438 being a lead-pipe cinch, as this guy promised, it was a bad one. Lots of anti-aircraft fire, of
439 course. There was always a lot of that over Germany, but just as we were approaching the target,
440 why there was a fighter attack which was bad business. The German fighters always attacked
441 the bomber formations head on. Well, I'm jumping ahead a little bit. Actually, so you get up at
442 3 or 4 o'clock in the morning, have some breakfast, get briefed on where the mission's going,
443 and navigators have a separate briefing, and radio operators have their special little briefing, and
444 then planes take off one after another and assemble at a certain altitude over the air base, flying
445 kind of in a circle, and you get together as a group. Then there were a bunch of radio beacons
446 called bunchers and splashers that were used to assemble larger and larger formations of aircraft--
447 -other B-24s from the Second Wing, which was what our bomb group belonged to, and several

448 wings joined, and then of course there were B-17 groups and wings that were also shaping up. It
449 was really tough work getting into these formations, hard work, especially on the lead planes,
450 and always the danger of midair collision if the weather deteriorated. So if you've never been
451 frightened before, why you'll get frightened before this is over. I mean, if you've never
452 experienced fear, I suppose I should say. "Fright," I suppose, is something different. You
453 experience fear, but this fighter attack was amazing. This group of I guess it was Fok-
454 Wolfs[SP?] 190s flew right through us head to head, and I remember looking out and seeing one
455 right off the wing tip go right the guy, blond German pilot, wearing nothing but the radio headset
456 and an oxygen mask, and then of course B-24s going down on fire, which is a sight you're not
457 used to, and then the engineer on our plane said, "I got one! I got one!" "Shut up," said the
458 pilot. Then we got over the target, and the lead bombardier was the guy who used the bomb
459 sight, and we flew in as tight a formation as possible. The lead bombardier used the bomb sight,
460 and when the lead bombardier . . . when the other planes in the formation saw the lead plane's
461 bombs go away, why they toggled their bombs out, so the bombardier on our plane was the nose
462 gunner, and the navigator actually dropped the bombs except in the lead plane, so you hit this
463 toggle switch, and then you see the bombs go in the lead plane, and then the plane leaps up when
464 it's several tons lighter, and then you beat it for home. So it's pretty--I think you said
465 "dramatic." It's dramatic, all right. So on our fourth such mission, one of the things that I
466 learned on this first mission was that the pilot asks the navigator to go down and exercise the
467 bomb-bay doors, 'cause . . .

468 END OF SIDE ONE

469 BACKUS: . . . exercise the bomb-bay doors, so on this fourth mission we began having
470 mechanical troubles right away. First we began siphoning gasoline out of the tank, and I've
471 never quite understood this, but anyhow, somehow this slip of air over the wing begins sucking
472 gas out. Anyhow, it was called "siphoning," so you're losing gasoline, streaming gasoline. That
473 happened to us. Then I went down to exercise the bomb-bay doors, and they opened, but when it
474 came to closing they wouldn't close, so had to advance the throttles to overcome the additional
475 drag. Then we got shot up. Our oxygen began running out. We had a number of other things
476 happen to us in the lines of mechanical failures, and we were at a turning point where we sort of
477 fainted--a boxer's feint--so that the enemy didn't know what the eventual target was. This was a
478 mission to Munich. The turning point was way down by Lake Constance--Bodensee--which

479 forms a border between Germany and Switzerland. So the oxygen began to run away down
480 there, after some antiaircraft fire, and gasoline was running away, and the engineer and the pilot
481 did the . . . have we got enough gasoline to get home? Doesn't look like it. Do we have enough
482 oxygen to get home? Doesn't look like it. So we'd been given an air field in Switzerland to go
483 into if we got in a jam like this. So we dropped out of formation and headed for Switzerland, and
484 the pilot said to me, "Get rid of the bombs." So I hit the toggle switch that dropped the bombs,
485 and they didn't go. The bomb-bay doors had crept a little bit. This is really off the subject of
486 being in oceanography.

487 TAYLOR: No, but it's part of your development.

488 BACKUS: Anyhow, the bomb-bay doors had crept just a little bit, so that some sort of interlock
489 or something or other that kept the bombs from going. So I picked out a nice, big, open, huge
490 field after field to drop these bombs in, but they didn't go, so the pilot tells the engineer to go
491 down and see what the hell is wrong with the bomb-bay doors, get 'em back open to the
492 maximum so that we can drop the bombs. And the engineer says, "OK." I hit the toggle switch,
493 and the bombs went away right down through the middle of a little German village. Ohhhh,
494 tough. So then we started across Lake Constance, into Switzerland. The pilot let the gear down.
495 This is another . . . It's a long, complicated affair. We went to where this air field was supposed
496 to be, and it wasn't there. So the crew all said to me, "You really know where the hell you are?"
497 I said, "Sure I do." It turned out later it was verified that there wasn't an air field at this position
498 that we'd been given in the very east and north corner of the country. So there was another air
499 field at a place called Duebendorf, where there's a lab that people here work out of sometimes, a
500 chemistry lab, I guess it is. It's funny how we started for this air field, and we were over a little
501 town called Bischofszell. We were fairly--I don't know, we were down around 10,000 feet by
502 now, I suppose. We'd dropped down from 20,000 feet. And over a place called Bischofszell
503 and the Swiss antiaircraft battery opened up on us. And shot some holes in us. It's a wonder
504 they didn't do us in, because they hit us, and we were quite low. Anyhow, there was a ketchup
505 factory in this place, and later whenever I saw a bottle of Swiss ketchup I was reminded of this
506 place. "Fabrik im Bischofszell," the ketchup bottle said, and that's where the Swiss shot us up.
507 Then a Swiss fighter came up and got on our wing, and escorted us, you might say, down to the
508 airfield in Duebendorf. So we were interned in Switzerland from (Let's see, this was April 9, I
509 guess.) 1944 until September. As soon as Allied troops came up against the border of

510 Switzerland, why a lot of us escaped from internment, which was exciting also--escaped into
511 France and then eventually got back to England and then eventually home. Then I was in the Air
512 Corps for another year and three-quarters, I suppose. I flew with a ferry command for awhile,
513 taking aircraft here and there, and then with the Air Transport Command in the Pacific, bringing
514 people home from . . . bringing people and supplies out, bringing people . . . bringing the
515 wounded back to the United States from places in the Pacific. And then in early March of 1946 I
516 went back to Dartmouth College a different person. [They laugh.]

517 TAYLOR: Yeah, you know, you go into a situation like this. You're 18, 19, 20 years old,
518 somewhere in around there, and you've been from a farm country and upstate New York, and
519 everything looked rosy and nice. You had a good family background, and then you get into a
520 situation like this and people are trying to kill you, and you're in a hostile environment. You
521 know, I take off on a plane now and I see a lot of people gripping the armrests with white
522 knuckles and whatnot, and when I compare 'em with a B-24 with all of the lines open. I mean,
523 you didn't have all the nice paneling. You had to wear an oxygen mask when you were up high.
524 The pilot probably had about 30 hours of training or something like that. [They laugh.] That's
525 scary stuff when people are shooting at you.

526 BACKUS: Yeah.

527 TAYLOR: 'Cause you're still a long way up.

528 BACKUS: Right, yeah, it was scary all right. Yeah. The pilot was a great guy. He stayed in
529 the Service, had a career as an Air Force officer in the Service, and then, when he retired from
530 the Service, he went to work as an instructor for Pan Am. And then he retired from Pan Am.
531 And as far as I know he's still going strong. A good man.

532 TAYLOR: When you were interned in Switzerland, what was that like? I mean, was this a real
533 prisoner-of-war camp, the kind we see in the movies?

534 BACKUS: No, it wasn't a prisoner-of-war camp. We were It's complicated. There were
535 complicated sets of rules about how you were held. But we found it reasonably easy to escape
536 once We weren't going to be heroic enough to escape from neutral Switzerland into Nazi-
537 held Europe, but as soon as the Americans, Allied Forces got up near Geneva, why quite a few of
538 us took off.

539 BACKUS: How long did it take you to get from where you were interned down to where the
540 American forces were?

541 TAYLOR: It took us about a day. We traveled on trains with some forged passes that would get
542 over part but not all of the trip. I had a girl friend who helped us, and we went to her aunt's
543 apartment in Geneva, and her cousin took us out on a local train, kind of a Yeah, it was part
544 of an urban transportation system. Took us out to a station. Got off in the dark, changed from
545 civilian clothes into remnants of uniform that we had. It was raining, fortunately. Crept across a
546 field of cabbages to a barbed-wire entanglement, smelled cigar smoke, beat our way through the
547 barbed-wire entanglement into France--Ferry Voltaire, actually. It was the little town of Ferry,
548 which is where Voltaire spent the last 20 years of his life or so. We were the first Americans
549 there. We always claimed we liberated this town. [They laugh.] We got met by the maquis, the
550 Forces Francaises de l'Interieur, the . . .

551 TAYLOR: French resistance?

552 BACKUS: French resistance. After a couple of days with them, why they took us over to an
553 American advanced fighter strip in a place called Amberieux. Then we went from there to . . .
554 God, we ended up going from there to Italy and then back to France, and then eventually back to
555 England. Lots of adventure. [They laugh.]

556 TAYLOR: If he were still alive, Errol Flynn would be playing Dick Backus in this particular
557 instance.

558 BACKUS: It was interesting. So anyhow, back in Dartmouth College, I had to take a Graduate
559 Record exam in physics. I don't know why. God, I'd never had a physics course in my life! But
560 I knew all this esoterica from being a navigator. I knew what right ascension was, and I knew
561 what sidereal hour angle was, and I knew all this stuff. I got a pretty decent score on the physics
562 exam. I practically didn't know any physics.

563 TAYLOR: But you know, this must have been almost a massive culture shock to go back to
564 Hanover to pick up the threads of your life again.

565 BACKUS: Yeah.

566 TAYLOR: Your life had just irrevocably changed.

567 BACKUS: Right, it really had. It really had. I'd gone from a boy to a man, among other things.
568 [Laughs.]

569 TAYLOR: A man who'd faced a lot of adversity. This was a tough period. See, I was a little
570 bit later than you, but I saw the Korean veterans coming back, and they were very different than
571 my classmates.

572 BACKUS: Right.

573 TAYLOR: They always say it makes you a man. There's a maturation process that goes on,
574 seeing things in a little bit clearer light, perhaps, than

575 BACKUS: Yeah. Well, I always appreciated being alive, but I guess I appreciated it even more
576 after all of that. I remember I was really elated when I was discharged from the Air Corps in
577 February of 1946, out in Patterson Field, Ohio. I remember heading for a train to come back to
578 Rochester, Webster. I remember saying, "Man, you're lucky. You're alive, and now you can do
579 anything you want, and the whole world is out there to do it in." [They laugh.]

580 TAYLOR: Must have been a great feeling.

581 BACKUS: It was a wonderful feeling.

582 TAYLOR: And you decided you were going to continue on with your botanical studies.

583 BACKUS: I continued botanical studies. In the meantime I'd gotten interested in zoology pretty
584 much, so I applied to graduate school at Cornell. I got a Master's Degree in zoology. There I
585 identified a teacher that really inspired me, a man named Edward Raney[SP?], who was an
586 ichthyologist. And I got to know him some, and he got to know me some, and he said, yes, he'd
587 take me as a graduate student, but he couldn't take me the next year because his quota was filled.
588 But he would save a spot for me for the year following. So I went to the University of North
589 Carolina in Chapel Hill for a year and studied with a limnologist named Robert Coker[SP?].

590 TAYLOR: Now, were you able to finance all this through the G.I. Bill?

591 BACKUS: Oh, yeah, the G.I. Bill just was wonderful. G.I. Bill made all this possible. I
592 worked, of course, at the same time. I was a teaching assistant and all that sort of thing.

593 TAYLOR: You were leading a pretty full life at this time.

594 BACKUS: Yeah, but the G.I. Bill was a wonderful thing. Yeah, that made everything possible.
595 I spent a year at University of North Carolina, then I came back to Cornell to study under
596 Edward Raney[SP?], and that was I was there from 1949 until 1952, three years in Ithaca as
597 a graduate student, and that's when I came to Woods Hole Oceanographic Institution.

598 TAYLOR: OK, now, this was on a doctoral track, at Cornell?

599 BACKUS: Yes, yes.

600 TAYLOR: Now you had a pretty solid background up to this point, and you had your botanical
601 studies, but then the interest in the zoological end came along.

602 BACKUS: Right.

603 TAYLOR: And now you run into an ichthyologist.

604 BACKUS: Right.

605 TAYLOR: A fish man.

606 BACKUS: Right, a fish man, right.

607 TAYLOR: And you found, you say, he was kind of an inspiring guy?

608 BACKUS: Yeah, he was a great guy. He was a wonderful teacher and enthusiast for life in
609 general and fish study in particular. The other critical thing that happened to me at that time was
610 an old Dartmouth College friend of mine named David Nut[SP?], who was three years ahead of
611 me. He was a senior at Dartmouth College when I was a freshman at Dartmouth. He was also a
612 botany major. He and I became friends. He bought a hundred-foot schooner called the *Blue*
613 *Dolphin*, and for the summer of 1949, organized an expedition to Labrador. And my first
614 introduction to Woods Hole was coming here in June of 1949 to join the schooner. I was going
615 to be off for the summer from graduate studies at Cornell. The *Blue Dolphin* was down here
616 scrounging a winch and certain other things--some reversing thermometers--so the ship was here
617 for a week or ten days. She was here when I got here. I hitchhiked down from Boston. I was
618 pretty excited. Anyhow, I went to Labrador on this schooner for the three summers of 1949,
619 1950 and 1951, so I guess maybe that during that first summer of 1949 was the only time that I
620 saw Wood Hole, but we were tied up at the dock, and it was only the Bigelow Building then,
621 plus all those shanties out in the back yard, of which there were quite a few. There was what was
622 called "The Garage," the "Penzance Garage," which the Institution, I guess, had bought from the
623 Penzance people. Anyhow, it was a long, ramshackle building that ran almost from the street
624 back to the dock, and the so-called "Garage Gang" was in that--all the mechanics that kept things
625 going. Although the machine shop and carpenter shop was in the basement of the Bigelow
626 Building, but all the other shops were out in this, what was called "The Garage." But the Garage
627 Gang were terrific. I got to see a lot of them--not much of the scientists of the Institution, but
628 during lunch breaks and coffee breaks, why people would drift out of the Institution buildings
629 and come down and drink their coffee on the dock or cast a plug out into the harbor for a bonita
630 or a bluefish or whatever. And ah man I was pretty impressed with what I saw of Woods Hole
631 and the Woods Hole Oceanographic Institution. And that was for a week or so, in June of 1949,
632 and I didn't see any more of the Institution, I suppose, for several years. But along in the spring
633 of 1952, as I could see my career as a graduate student closing, I came to the realization that I

634 needed a job, and I thought, “Where am I going to get a job?” And I thought, “Boy, that Woods
635 Hole Oceanographic Institution--that looked like a neat place. I wonder how you get a job
636 there?” So this was really before the days of postdoctoral fellowships. You went right from
637 graduate school to a job, and nowadays, of course, that’s relatively rare. I suppose almost
638 everybody has a postdoctoral appointment for a year or two or more.

639 TAYLOR: That’s because in our day, there were only about 100 people in the field. I mean,
640 now it’s exploded, and they’ve got to find a . . .

641 BACKUS: Yeah.

642 TAYLOR: . . . place for ‘em somewhere.

643 BACKUS: Yeah. Anyhow, I thought, “Man, where am I going to get a job. Oh, I got Woods
644 Hole Oceanographic Institution. That looked like a place to work.” I mean it had a reputation
645 then as it has a reputation now, and I knew that I wasn’t going to get a job just asking for it. I
646 knew it was going to be tough to get a job, but I thought, “Well, here goes. What can I lose?”
647 So I wrote a letter to Dr. Redfield and said, “I’d like to come to work at the . . .” He was sort of
648 responsible for biology and associate director, I guess he was called. So I wrote him a letter and
649 said I’d like to come to work at the Woods Hole Oceanographic Institution.” It was kind of a
650 naïve approach--just write and say you wanted to come to work there. So I got a polite letter
651 back from him right away, and he said, “That’s fine, but if you’ve got a job at the Woods Hole
652 Oceanographic Institution, what would you propose to do? What would you propose to study?”
653 And I thought, “Oh, hmmm. What would I do?” So I knew the answer had to be good. I knew I
654 couldn’t say just anything and get a job. I knew I had to say something good, and I was not
655 having enough success at figuring out what to say, not having any really bright ideas. My thesis
656 had been on the fishes of Labrador, and you can’t carry that one very far. [They laugh.] So I
657 was really sweating this, thinking, “What am I going to say? What am I going to propose?” And
658 I got a second letter from him. He said, “There’s a group here at the Institution headed by a man
659 named Brackett Hersey, who is a geophysicist, and this group of physicists and geophysicists and
660 electronicers[SP?] and engineers and so on are interested in underwater sound in the ocean,
661 sound as it occurs, natural sounds in the ocean, sound transmission, sound as a tool to study the
662 structure of the earth beneath the sea, and so on. And they’re proposing that they add a biologist
663 to their group. Would you like to apply for that job?” “Oh, boy, would I?” [They laugh.]

664 TAYLOR: So that's how you got mixed up with Woods Hole--essentially a physical-science
665 outfit.

666 BACKUS: Right, right. And it's how I got a job at the Woods Hole Oceanographic Institution,
667 because I considered that the piece of luck of my life after getting out of World War II with an
668 intact hide--the luck of my life.

669 TAYLOR: Few things I want to ask you about that particular period, because a lot of things
670 were in transition. The Second World War had ended. Unfortunately for the world, fortunately
671 for Woods Hole, the Cold War started after that, and Woods Hole was able to go from what
672 basically was a summertime venue, up until the Second World War, to a full-time kind of field.
673 But yet, the period that you were getting out of your graduate studies as a biologist, now, it was
674 still a pretty adventurous kind of time. I mean, this was not the standard science in the white lab
675 coat in the beautifully appointed laboratory.

676 BACKUS: No.

677 TAYLOR: Boy, there were some adventure. You were going to be out to sea.

678 BACKUS: Right.

679 TAYLOR: There was a real "Indiana Jones" component to this.

680 BACKUS: Right. Well, I was hooked on adventure. I knew from boyhood on that I wanted to
681 have some sort of adventurous life, and it looked to me like being some kind of scientist was the
682 best way to have an adventurous life, and it certainly turned out that way--a combination of
683 physical and intellectual adventure.

684 TAYLOR: In that generation, the movies we saw and things like that, the scientists were never
685 in white lab coats. They were always out climbing down a volcano, inside the earth in Iceland,
686 or they were out chasing gorillas around some place. I used the term "Indiana Jones."

687 BACKUS: Yeah.

688 TAYLOR: I see your era as being like that--seaman-scientist/adventurers.

689 BACKUS: Right, well that's certainly the kind of scientist that I wanted to be. I didn't want to
690 be a white-lab-coat, never-leave-the-laboratory scientist. So, as I say, that was a great stroke of
691 luck, to get that job with the Hersey group, which I ended up liking a whole lot. They were
692 really nice people. He was a great guy. He was wonderful to me. He gave me every
693 opportunity.

694 TAYLOR: Now, did you have to interview with Brackett Hersey before

695 BACKUS: I did. I came down, and I was interviewed by Hersey and by Dr. Redfield.

696 TAYLOR: Was that a sweaty-palm experience for you.

697 BACKUS: Ye-ah, except I Yeah, somewhat. Except I was feeling pretty cool those days,

698 I guess. [They laugh.] Yeah, sure, I was on my toe tips. Sure. The interview went very well.

699 Brackett Hersey never discovered that I had never had a course in physics because he never

700 asked me.

701 TAYLOR: And you weren't about to tell him.

702 BACKUS: I wasn't about to tell him. So shortly after I And I had good letters of

703 recommendation from various people, so shortly thereafter I was offered the job, which I

704 grabbed: annual salary of \$4,800. [They laugh.]

705 TAYLOR: About what a public-school teacher was making during that period. Hersey was

706 Could you give me a thumbnail on Brackett Hersey, what he was like?

707 BACKUS: Yeah. I always admired him greatly, and when he left the Institution and became a

708 civil servant in the Office of Naval Research or wherever it was--I guess it was ONR, I heard

709 him criticized for not being aggressive enough, but he always seemed reasonably aggressive to

710 me. Anyhow, my picture of him is of a person who spent most of his time, instead of acting,

711 reacting. He was the skilful manager of this big group--I don't know how many people worked

712 for the group, but there must have been at least 20 or 24 people working for this group.

713 TAYLOR: With huge differences in background.

714 BACKUS: Oh, huge differences in background. There were physicists and geophysicists, and

715 electronics engineers and technicians, and data reducers, and it was a grand bunch of people. I

716 really liked them. But he spent most of his day, when he was in Woods Hole He traveled a

717 fair bit to Washington, and so on. When he was in Woods Hole, my image of him is sitting in

718 his office talking to one, two or three people, and then when those people got through, another

719 individual or another small group would come in, and Brackett would discuss problems--where

720 this particular person's work was going and so on. And he would make decisions, he would

721 advise, he would iron out problems, calling other people as necessary. It seemed to me he was

722 always doing that. His life was one of always interacting, reacting to what he was being told by

723 various key people in the group. He was a smart, smart man. He had been well trained in

724 physics and geophysics, a Princeton graduate and I believe his doctor's degree came from

725 Princeton, grew up in, I think, in Wolfborough, New Hampshire. Father died at an early age.

726 Don't remember that he had any brothers and sisters. Had two children, lived in Juniper Point,
727 had two kids, a son and daughter.

728 TAYLOR: Now about how old were you at the time when you came here?

729 BACKUS: I came here, I was approaching my 30th birthday.

730 TAYLOR: So still a real young guy.

731 BACKUS: Yeah.

732 TAYLOR: And when you came in You know, one of the ways I might describe Brackett
733 Hersey is that he was almost an institution within the Institution.

734 BACKUS: He was. He was, because he had this big slug of money from the Bureau of Ships to
735 study sound transmission in the ocean and then we did a lot of exercises that involved
736 submarines. We did exercises with submarines out on the continental shelf and then out on the
737 slope. Sometimes those exercises were quite complicated. I remember working with not only a
738 submarine--generally only one at a time--a submarine, destroyer, a blimp once. Sometimes we
739 had two ship operations, *Bear* and *Atlantis*.

740 TAYLOR: That's when one would be a listener when you were . . . ?

741 BACKUS: Sometimes, right. And often it was very desirable, of course, to combine the work
742 with submarine with non-military-related work, so that we often would work with a submarine,
743 and then the submarine would leave, and then we would do seismic refraction or seismic
744 reflection work. *Bear* often--usually, regularly, always, maybe--being a listening ship, and we
745 fired a lot of explosives, and those were fired by *Atlantis*. But on one seismic refraction exercise,
746 the *Atlantis* would start way out, maybe 10-15 miles away, and start coming in to *Bear*, headed
747 right for *Bear*, firing explosives on a regular schedule, and then they would go off another 10 or
748 15 miles in the other directions than that, and those sound waves resulting from those explosions
749 would be refracted in certain ways by the crust of the earth, and as the range changed the
750 successive receptions let one make some pretty solid deductions about the thickness of the
751 earth's crust and its constitution.

752 TAYLOR: You know, I'm going to ask you to comment on Brackett Hersey's group--not so
753 much as a group but as an entity at that particular time in the development of the oceanographic
754 field. Up until the Second World War, this place didn't have a lot of what today we would call
755 real scientists. You might have called them "naturalists" now. Your generation coming along

756 were some of the first real scientists, guys that had academic credentials to go along with I
757 mean, there weren't many Ph.D.s before the Second World War.

758 BACKUS: There were some.

759 TAYLOR: There were some, but you had a lot of guys who had bachelor's degrees and maybe a
760 master's degree.

761 BACKUS: Yeah, well

762 TAYLOR: You had guys that were artists, like

763 BACKUS: Right, like Fuglister.

764 TAYLOR: Yeah, or like Al Woodcock, who was a high-school dropout.

765 BACKUS: Oh, yeah. Some amazing, amazing people.

766 TAYLOR: Well, you see, this is what I want to get at. There's a blending that's going to take
767 place here, where you (for lack of a better term) "legitimate" guys that have put in all the years
768 for a graduate study, and these--what I think of as--really incredible people that may not have
769 had academic backgrounds but god they could turn their hands to anything and come up with
770 some kind of device or way of doing something.

771 BACKUS: Right.

772 TAYLOR: And I think Brackett Hersey's group probably was one of the first where you melded
773 all of those together. I mean, they had you, a biologist (and I still want you to talk to what the
774 heck a biologist was going with this group). But let's say with Brackett Hersey, who was a
775 Ph.D., but you also on the other end had a Bill Dunkle, who was a high-school graduate, but still
776 at that point an essential part of that team, getting certain kinds of things done.

777 BACKUS: Right. What always rises in my mind when I think about people that were here when
778 I came that Fall of 1952, the sort of people you've been talking about, is epitomized by the
779 Physical Oceanography Department, that had Fuglister, Stommel, Val Worthington, Gary
780 Metcalf, and others, and there wasn't a Ph.D. in the place.

781 TAYLOR: They couldn't get through the front door today.

782 BACKUS: Val had been kicked out of Princeton. He was a Latin major, and he had been kicked
783 out of Princeton. And Henry Stommel wasn't sure whether he wanted to be a theological student
784 or something else. And so on. Fuglister was an artist. They were terrific people. They made
785 huge contributions to physical oceanography. It was amazing. It was wonderful to be around
786 those guys. Yes, it was an amazing institution then.

787 TAYLOR: But I really think that at that point the Institution was going through a huge, huge
788 change. BACKUS: That's right. It was changing and changing, and changed rapidly. Changed
789 rapidly at that point. But I did a lot of I remember it seemed to me for several years I
790 didn't do very much except slack hydrophone cables and pull 'em in, and I thought, "Jesus, I
791 went to graduate school so I could heave on these hydrophone cables and roll my guts out in the
792 *Bear?*" But I was getting paid, and I was having a good time, so I didn't worry too much about
793 it.

794 TAYLOR: You were learning the trade.

795 BACKUS: I was learning a lot of things, right. I was learning about going to sea, and I learned
796 a lot of things that I didn't know. I learned a lot of physics from people in the Hersey group, and
797 he was very generous to me. He gave me every break, and after awhile he said, "Now you've
798 been here for awhile, but you haven't gotten any papers out." And I thought, "Well, I haven't
799 had a whole lot to write papers about." But anyhow, he was generous. He definitely had an eye
800 to my future at this institution and knew that I needed to start producing papers, which I
801 eventually did, some with him. A principal thing that I was interested in, which stemmed from
802 the interests and capabilities of this group, was sound scattering by marine animals, and one of
803 the things that had been discovered shortly before I came here was the so-called deep scattering
804 layer, which was presumably a layer of animals of some kind, because the layer moved up to the
805 surface at sunset and away from the surface again with sunrise, so that diurnal vertical migration
806 (so-called) could only be accomplished by something organic, something live. So the question
807 then was what was this layer, and of course it turned out to be many layers, but people wanted to
808 know what were the constituents of this layer or layers and Hersey was very interested in that,
809 and of course it required the help of a biologist, among other things.

810 TAYLOR: Well, you know, it's interesting, that whole thing on the deep scattering layer:
811 during that period for biologists had about the same interest level as plate tectonics had for the
812 geologists as you went along. I mean, I'd even heard that discussed in dive shops with the
813 original scuba divers and things like that.

814 BACKUS: Right.

815 TAYLOR: It was one of the big things.

816 BACKUS: Right, yeah.

817 TAYLOR: OK, I'm going to

818 [END OF SIDE 2, TAPE 2]