

Howard Birndorf

*Interview conducted by
Matthew Shindell, Historian, UCSD
April 30, 2008*

SAN DIEGO TECHNOLOGY ARCHIVE



Howard Birndorf



Howard C. Birndorf is the Founder of Nanogen Inc., and served as its Chief Executive Officer from December 2002 to July 2009. Mr. Birndorf Co-founded Nanotronics, Inc. in 1991 and served as its President. He served as President of Nanogen Inc., from January 2000 to September 2000 and as Chief Financial Officer from December 1997 to July 1998 and from September 1993 to October 1997. Mr. Birndorf was a Co-founder and Chairman Emeritus of Ligand Pharmaceuticals Inc., where from January 1988 to November 1991 he was President and Chief Executive Officer. He was also a Co-founder and Executive Vice President of Gen-Probe Inc., Co-founder and Vice President of Corporate Development at Hybritech Inc., Co-founder and Director of IDEC Pharmaceuticals Corporation, and was involved in the formation of Gensia Pharmaceuticals Inc. (now SICOR Inc.). From November 1991 to January 1994, Mr. Birndorf was President of Birndorf Technology Development, an investment and consulting company, and a founding Director of Neurocrine Biosciences Inc. He serves as Chairman of the Board and Director of FasTraQ Inc. He served as Executive Chairman of Nanogen Inc., from 1993 to August 2009. Mr. Birndorf serves on the board of Hartraq. He was a founding Director of Graviton Inc. and a Director of the Cancer Center of the University of California, San Diego. Mr. Birndorf received a B.A. in Biology from Oakland University and an M.S. in Biochemistry from Wayne State University. Mr. Birndorf received an honorary Doctor of Science degree from Oakland University.

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INTERVIEWEE: Birndorf, Howard

INTERVIEWER: Shindell, Matthew, Historian, UCSD

INTERVIEW: Part 1 of 2

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7 **SHINDELL:** Okay. So, this is interview number one with Howard Birndorf. It is April
8 30, 2008. So, I thought we might start by talking about sort of where you come from.
9 Could you tell us where and when you were born?

10 **BIRNDORF:** I was born in Detroit, Michigan in February of 1950, February 21, 1950.

11 **SHINDELL:** Okay. And, what sort of a family, or how would you characterize your
12 family?

13 **BIRNDORF:** I was the oldest of three boys. I have two younger brothers. My father, our
14 family was I would say lower middle class, but solid middle class. We, we lived in an area
15 of Detroit, the northwest side of Detroit, primarily a Jewish neighborhood. I, being first
16 born I was certainly the apple of my mother's eye. She was quite doting over me. I think
17 my parents were good parents. We had a very good childhood. I went to school. Started at
18 kindergarden in a school called Hampton Junior High. It turns out that our family lived fort

19 of on the other side of the tracks. There was a street called Livernois Avenue and the
20 wealthier children that went to the school lived on one side of Livernois. We lived on the
21 other side of Livernois. I didn't really know that at the time but as I grew up I recognized
22 that. We walked to school. I walked to school. It was an all-Jewish classroom. It was a
23 public school, but all (Shindell: Uhm-hmm.) Jewish. The kids that I went to kindergarden
24 with were kids that I went all the way through ninth grade with. And, I remember those
25 times as happy times. My brother, one brother was born three years after me and then
26 another brother was born, I think, eight years after me. (Shindell: Uhm-hmm.) We lived
27 in, in a small house, in a, on a sort of unique block. It was just a – in Michigan, in Detroit
28 the streets had multiple one, one street would have multiple blocks, (Shindell: Uhm-hmm.)
29 but the street I lived on just was one block long. It was called London, and my address was
30 6464 London. [Laugh] I still remember that. And, one of my mother's closest friends was
31 a neighbor and I grew up, her son was my age so we were friends. I remember some of my
32 childhood friends in that level. It was a fairly ordinary childhood. I think one exception
33 was, when we were out for summer vacation my mother's father owned a farm, a working
34 apple farm in Ann Arbor, (Shindell: Uhm-hmm.) that had about 50,000 fruit trees, apples
35 primarily but also cherries, peaches, and plums. And so, every summer we would go up to
36 Ann Arbor and spend the summer on the farm. (Shindell: Uhm-hmm.) And, it was my
37 brothers and myself, and my mother would go out there and stay at my grandfather's house.
38 And on the farm was my, her brother's family lived and he had two boys and a girl. And,
39 the two boys, the two oldest boys were also my and my brother's age. (Shindell: Uhm-
40 hmm.) So, the four of us spent the summers together on the farm causing trouble, [Laugh]
41 learning how to drive when we were like seven, [Laughter] crashing into things, ice skating

42 on the pond. There were cows, and horses, and so it was fairly idyllic child, that was a real
43 (Shindell: Yeah.) great way to grow up. They had a cider mill there and in the fall they
44 would press cider and sell cider to like the University of Michigan football (Shindell: Uhm-
45 hmm.) games, and things like that. So we, we did that throughout our childhood through,
46 through high school, through college. Every summer we spent, and falls, you know, and
47 weekends and things we would work out there. So, I started working when I was quite
48 young, (Shindell: Uhm-hmm.) and I was paid. As I grew up I would, as I got older I would
49 start actually working on the farm in the summers and (Shindell: Uhm-hmm.) get money
50 for that, and my family was always, my father was a shoe salesman. A shoe representative.
51 (Shindell: Uhm-hmm.) He, he had samples and he would go, on Monday he, his territories
52 were Michigan, Ohio, and sometimes Indiana. And, he would leave on a Monday morning
53 many, many weeks and he would come back on Fridays, and during the week he would go
54 and drive to various stores, show them samples, and (Shindell: Uhm-hmm.) get orders for
55 the next season.

56 **SHINDELL:** Was he working for any particular shoe factory or company?

57 **BIRNDORF:** Yeah. He worked, well he worked for several while he was alive, but the
58 one he worked for the longest was something called Craddock-Terry Shoe Corporation,
59 (Shindell: Uhm-hmm.) from Lynchburg, Virginia, and he was there for many years. And . .
60 .

61 **SHINDELL:** It's interesting, actually, that your father worked in, in the shoe business
62 because sort of the classic example of industrial clusters is shoe factories and shoe
63 manufacturers. So, you've, you've sort of gone into the latest example of the (Birndorf:

64 Yeah.) high technology cluster. [Laugh]

65 **BIRNDORF:** Right. So he, yeah, well that, I don't know if there were other shoe factories
66 in Lynchburg, Virginia (Shindell: Uhm-hmm.) but I assume there might have been. I don't
67 know. In any event, [moves away from microphone – drawer opens] he was gone a lot, and
68 during the week [back at microphone] we just had normal weeks, and the summers we
69 spent on the farm. But he, he didn't make a lot of money and I think that he spent a lot of,
70 he had a lot of stress about money over the years, I believe, in retrospect. So, I think,
71 several focuses of my life when I was younger were to go to college. (Shindell: Uhm-
72 hmm.) It was clearly a, an impetus for us. (Shindell: Uhm-hmm.) My father's only
73 brother, and they grew up during the Depression, he, the two of them started in college but
74 since my grandfather only had enough money to send one, his older brother ended up going
75 to college, (Shindell: Uhm-hmm.) to Wayne State, and became a physician, so he was
76 quite, had much more money than my father. And, I think though that was a, something
77 that was clearly inputted to me early on, (Shindell: Uhm-hmm.) the drive to work, to get an
78 education, to strive to make money beyond what my father had done. (Shindell: Uhm-
79 hmm.) I saw his struggles. (Shindell: Uhm-hmm.) Although, I don't think we ever knew
80 that we didn't have a lot of money. We never wanted for anything. (Shindell: Uhm-hmm.)
81 We always had tricycles, and toys, and he did send three of us through – they told us when
82 we were younger that we want, if we went to college they would pay for our undergraduate,
83 and they did. They paid for all three of us. (Shindell: Uhm-hmm.) They paid tuition,
84 books, and if we want, and lodging, and if we wanted anything else we had to work. So, I
85 worked on the farm and all through high school, even before high school perhaps, at jobs,
86 (Shindell: Uhm-hmm.) summer jobs, after-school jobs. I started working at a very early

87 age and worked continuously since then, and to this day. [Laugh]

88 **SHINDELL:** In an interview that you did with Mark Jones when he was researching for
89 his PhD dissertation, I don't, you probably remember these interviews, you did mention that
90 you had sort of two role models growing up, one being your uncle and the other your
91 father. I don't know, I was hoping maybe you could go into a little bit more depth about the
92 way in which those two influenced you and, you know, what you think you sort of carried
93 forward from, from them?

94 **BIRNDORF:** Well, I think, from my father it was the work ethic. I mean, he did work
95 hard and he was able to juggle his meager earnings to (Shindell: Uhm-hmm.) create a world
96 where his kids didn't realize that they were meager.

97 **SHINDELL:** Did he ever attempt any entrepreneurial activity of his own, or did he stick
98 with working for the shoe companies?

99 **BIRNDORF:** Well, he pretty much was risk adverse as I recall. He was the kind of person
100 that would, was very helpful to his friends. I mean, if somebody wanted something he
101 would go out of his way to help them. On the other hand, he was also the kind of person
102 that would go out of his way to find the best price for something. (Shindell: Uhm-hmm.)
103 So, he would go and spend an inordinate amount of time shopping for an item, and if he
104 could find it at a better price somewhere else, it would – he could spend hours searching
105 and he would always get, by far, you know, (Shindell: Uhm-hmm.) he would find the deals.
106 So, he was very frugal in a way and he, you know, hated to waste money. His father was
107 extremely frugal. (Shindell: Uhm-hmm.) My grandfather was much more frugal than he
108 was. But he was frugal, but he had a very strong work ethic, but I think he was always in

109 competition. Most of his friends were wealthier than he was (Shindell: Uhm-hmm.) and I
110 think that he was always striving to have what they had, to give us what other kids had, and
111 that kind of thing. I think that stress was very difficult for him and (Shindell: Uhm-hmm.) I
112 think it ended up killing him, you know, and he died when he was in his early sixties, mid
113 sixties. (Shindell: Uhm-hmm.) And, he had a heart attack, a major heart attack in his
114 fifties. His brother, my uncle, who was the doctor, affected me in a very different way
115 because he was, you know, from a very early age we would go to him for our medical
116 treatment. And, as we grew up and would go to his office or see him, he had a summer
117 home. We would go out to the lake where he had this and spend our weekends many times,
118 and we had lots of family dinners, (Shindell: Uhm-hmm.) and every Sunday night the
119 grandparents were over and we had the Jewish holidays together, and (Shindell: Uhm-
120 hmm.) all that stuff. But, when I'd go to his office I'd see how his patients idolized him.
121 (Shindell: Uhm-hmm.) He was a very good doctor in terms of providing medical care and
122 his patients really appreciated him. I mean, he was like a god to them, and I could sense
123 that even very early on in my life that that education level and his expertise provided him
124 some adoration of his patients. In terms of my father's entrepreneurial activities I don't
125 think he really had many. I do know that when my mother's father died she was left a bit of
126 an inheritance. I don't think it was very much. It was maybe a hundred, or a \$150,000,
127 which today isn't much but back then it was. And, we then moved. We bought a house in
128 the suburbs. I was fifteen and we moved from Detroit proper to a suburb about thirty or
129 forty miles away called North Farmington. (Shindell: Uhm-hmm.) And, I do believe he
130 took some of that money and invested in stocks, that he got tips from people, and I don't
131 think he did well. (Shindell: Uhm-hmm.) I think he lost a lot of money in the stock

132 market, or a lot of money then, for him, in the stock market. Because, I remember he
133 invested in something called Scotch Liquid Gold. I believe it was some sort of cleaner
134 (Shindell: Uhm-hmm.) or product that he heard was going to take off and I do believe it
135 went broke and [Laugh] he lost all his money. But, I don't recall him ever having any real
136 entrepreneurial kinds of things. He liked to fish. (Shindell: Uhm-hmm.) He liked to play
137 golf. Those are all the things I remember. I can't remember anything else that he was
138 really (Shindell: Uhm-hmm.) passionate about. He was a great dad and he seemed to be a
139 very good husband. My parents seemed to have a very good relationship and they were
140 married for thirty-four years, I believe, (Shindell: Uhm-hmm.) before he passed away.

141 **SHINDELL:** Now, maybe we should talk about sort of your education at that point. Was
142 science a big part of your undergrad, or prior to undergrad, your sort of secondary school
143 education, or when would you say you were first exposed to (Birndorf: Yeah.) science or
144 technology?

145 **BIRNDORF:** And, I said this before, I don't believe science was a big deal in my, in my
146 high, junior high school, you know, primary school or secondary school. I went to this one
147 school, Hampton Elementary through ninth grade, and that was right when I was fifteen is
148 when we moved. (Shindell: Uhm-hmm.) And because, at those days, they had half years.
149 You could start in either September or January. (Shindell: Uhm-hmm.) I had started in
150 January, because my birthday was in February. I was to go start, I was in tenth grade when
151 we moved, or I would have been in tenth grade but if I went and took summer school I
152 would start in the new school at eleventh grade. So I went, the summer we moved I stayed
153 in Detroit and went to high school. I had gone to, that's right I'd gone to one semester of
154 high school and then I'd went to summer school. (Shindell: Uhm-hmm.) And so in the fall,

155 in September when school started in the new school where we moved I started in eleventh
156 grade. So basically, I got a half a year bump. (Shindell: Uhm-hmm.) Because, when I
157 graduated high school I was only seventeen, because of that. But in high school I was, I
158 would say I was more of a class clown type person. (Shindell: Uhm-hmm.) I was
159 clowning around. I was not real big into sports. I worked all through high school in a drug
160 store. I had summer jobs, worked on the farm. (Shindell: Uhm-hmm.) And then, when I
161 started college I applied to a small school called Oakland University. I really didn't think I
162 could get in. I had, I was a B student (Shindell: Uhm-hmm.) in high school and I wasn't
163 sure of could get into U of M and I had convinced myself [dropped pen on desk] even
164 though I probably would have wanted to go there, I convinced myself that I would have
165 preferred a smaller school (Shindell: Uhm-hmm.) and I, and I went to a place called
166 Oakland University, which was a, sort of an experimental school. (Shindell: Uhm-hmm.)
167 It was started by, it was under the auspices of the State of Michigan but it was started by
168 Matilda Wilson Dodge, on her estate called Meadowbrook, which was out in Rochester,
169 Michigan where she had this three-hundred-room mansion and 1,500 or a couple thousand
170 acres. And she built this school out there and provided the funding for the initial school.
171 When I started there they had one, I think they had had one graduating class, so they were
172 four years old, and it was a very small school. They offered classes with like ten people in
173 them. And, as I was there, the four years I was there, it grew, (Shindell: Uhm-hmm.) and
174 it's much bigger now. In fact, they're starting a medical school there I just saw the other
175 day. I started as a political science major.

176 **SHINDELL:** Now, how did you choose political science? What drew you to that?

177 **BIRNDORF:** Nothing.

178 **SHINDELL:** Nothing?

179 **BIRNDORF:** It was, I didn't know what I wanted to do. I wasn't clear on really anything.
180 I started college in September of '67. I graduated high school in, you know, June of '67,
181 and I started college in September of '67, and that was right around the time that things
182 were really starting to change in the country. (Shindell: Uhm-hmm.) That was during the
183 Vietnam War. I lived on campus my first year. I lived in the dorms. My first and second
184 year I lived in the dorms. So, in '67 I went in, I was wearing cuffed pants, penny loafers,
185 (Shindell: Uhm-hmm.) and a shirt, and in '68 I was wearing work boots, and jeans, and
186 smoked pot for the first time in '68, experimented with some other things. And, '68 was
187 really, when things really started getting, there were (Shindell: Uhm-hmm.) starting to get
188 anti-war demonstrations on the campus.

189 **SHINDELL:** So, the Oakland campus was a pretty political place in that time?

190 **BIRNDORF:** Well, it was no more political than the other place, but I think it was, it was
191 as political as things were getting then. (Shindell: Uhm-hmm.) And, everybody started
192 growing hair. We had hair, I had hair longer than yours, [Laugh] and beards. And, in '69 I
193 went to Woodstock, for example, and we went to other rock festivals. (Shindell: Uhm-
194 hmm.) So, things were really, we were right in the middle of the revolution at the time.

195 **SHINDELL:** Uhm-hmm. So, you probably wouldn't have ever, at that point, imagined
196 yourself as one of the founders of San Diego's first biotech companies? [Laugh]

197 **BIRNDORF:** No. No. Not at all. I was, my parents were quite worried about me. They
198 went to a psychiatrist. I had, I was experimenting with various drugs. (Shindell: Uhm-
199 hmm.) I was political. I was very immersed in this whole culture. (Shindell: Uhm-hmm.)

200 And, I was still going to school. I was still doing, getting decent grades, and in my junior
201 year is when I, I decided to switch to biology. (Shindell: Uhm-hmm.) [Jet plane in
202 background] I'm not sure why I did that, thinking back. I think I wanted to see about being
203 a doctor. In fact, I'm sure of that. I wanted to see about perhaps going to medical school.
204 (Shindell: Uhm-hmm.) So, I switched majors to biology and the very first, not the very
205 first biology, so the first in my junior year I had to take the initial biology classes,
206 (Shindell: Uhm-hmm.) Biology 101 and those kinds of things, and I took all of those. It
207 was in my senior year where I really got turned on by science. That was when I took an
208 independent study with a guy named John Cowlshaw, who was really one of the guys who
209 did influence me quite dramatically in my future.

210 **SHINDELL:** Uhm-hmm. Do you know how he would spell his name, by the way?

211 **BIRNDORF:** I have his information.

212 **SHINDELL:** Oh, okay. Great.

213 **BIRNDORF:** C-O-W-L-I-S-H-A-W, I believe.

214 **SHINDELL:** Oh, okay.

215 **BIRNDORF:** But, I can get that for you.

216 **SHINDELL:** And so?

217 **BIRNDORF:** I took an, I took some classes with him and then I ended up taking an
218 independent study, (Shindell: Uhm-hmm.) and that study was, he was interested in blue-
219 green algae. And, I did some studies with him, some independent study, doing independent

220 research (Shindell: Uhm-hmm.) on blue-green algae and that's when I realized that I was
221 doing things that nobody else had ever done before and that was the, really magical to me.
222 That was something that really intrigued me. The idea of doing research that heretofore
223 had not been (Shindell: Yeah.) ever done.

224 **SHINDELL:** And was this primarily work in a laboratory, (Birndorf: Yes.) or at a
225 research site outside one?

226 **BIRNDORF:** No. This was in the school, in the lab. We used to grow up these algae and
227 then do experiments on them, and then record the results, (Shindell: Uhm-hmm.) and I
228 forget the actual thing [Laugh] we were trying to do. But, we did it. Whatever it was we
229 found whatever we were looking for.

230 **SHINDELL:** So, how many people, what was basically the size of the lab and do you
231 remember how it was structured?

232 **BIRNDORF:** Well, it was a one-on-one deal. (Shindell: Uhm-hmm.) I mean, it was an
233 independent study, so I reported directly to him, (Shindell: Uhm-hmm.) and I would go into
234 his office periodically, sit down with him, and then we would go over things, and then I'd
235 go off and do the experiments we had agreed on and then come back. You know, that kind
236 of thing. (Shindell: Uhm-hmm.) And so, the lab was small. I had taken other labs before.
237 I don't think -- I was always sort of intrigued by lab stuff. (Shindell: Uhm-hmm.) I liked
238 that. I believe that I was pretty good in the lab. I was sort of technically good.

239 **SHINDELL:** From, just from the start?

240 **BIRNDORF:** Yeah. I mean I, I was able to, I was, things were very exact. Sort of like

241 cooking, or something like that, and I was, somehow I was good at it. (Shindell: Uhm-
242 hmm.) I was good at specifically doing things, and timing things, and waiting for things.
243 What I don't think I was good at was the creative side of that, (Shindell: Uhm-hmm.) was
244 thinking about the long-term experiments that needed to be done to prove something. I
245 never thought of myself as a particularly good student. I, actually one of the things, when I
246 was already a senior in college and I didn't think I had learned very much and one of the
247 things this guy did was he took the time to sit down with me. And when I, we were, I
248 remember this very clearly. We were looking at exponential components, where you put
249 like 10^3 and (Shindell: Uhm-hmm.) if you added them, and I really didn't understand that at
250 the time, even though I had supposedly learned it (Shindell: Uhm-hmm.) at least a year
251 before. And, he sat down with me and explained it to me in a way that I understood it, and
252 I really felt that he took the time to teach me something. (Shindell: Yeah.) You know, he
253 really did teach me something. He taught not only things that I should have probably
254 known before, but also he taught me this whole concept of research and (Shindell: Uhm-
255 hmm.) what it was, and the idea of it. And, that was, that was sort of interesting. And now,
256 then it was, pretty soon it was time for me to apply to school. (Shindell: Uhm-hmm.) So, I
257 applied to, I don't know, five or six medical schools, the University of Michigan, Michigan
258 State. I may have applied to some out-of-state medical schools, I don't remember. I'm sure
259 I did. And, as a backup I applied to Wayne State University Biochemistry Department
260 (Shindell: Uhm-hmm.) thinking that, you know, that I liked the science and I liked being a
261 scientist and that would be a nice, perhaps a good route to take. And, it turns out I didn't
262 get into any of the medical schools. I took the MCAT, (Shindell: Uhm-hmm.) I didn't do
263 particularly well on them, but I did get into Wayne State University. Not only did I get in

264 but I got in on a scholarship. (Shindell: Uhm-hmm.) I told you my parents said they
265 would pay for school, but they said if I wanted to go beyond undergraduate I would have to
266 do it myself, (Shindell: Uhm-hmm.) financially. And so, I got this scholarship, which not
267 only paid for books and tuition but also paid, gave me a stipend, (Shindell: Uhm-hmm.) and
268 it wasn't much. It was maybe \$50 a week or something, but it was enough. (Shindell:
269 Uhm-hmm.) So, at that point . . .

270 **SHINDELL:** This was 1971 when you started at Wayne?

271 **BIRNDORF:** Yeah.

272 **SHINDELL:** Yeah.

273 **BIRNDORF:** So, this was, I graduated in April, or April or May of '71 and I started in
274 September of '71. That's right. And, it was at the brand new medical school. They had just
275 built it. I think they had, I'm not even sure. It might have been the first year of operation
276 that I started there. It was brand-spanking new. (Shindell: Uhm-hmm.) And, so that's
277 what I did. I went and started there.

278 How are we doing?

279 **SHINDELL:** Oh, we've been going for about twenty-five minutes. So.

280 **BIRNDORF:** Okay. I started there in September of '71 and started taking the classes, and
281 you know, it was, some of it I liked and some of it I didn't. Organic chemistry I didn't like
282 (Shindell: Uhm-hmm.) very much. Some of the . . .

283 **SHINDELL:** That's one of there reasons I dropped premed, actually, originally. [Laugh]

284 **BIRNDORF:** Yeah. Organic chemistry was tough, and there was physics, and you know,
285 there was some of the stuff I didn't like and some of the stuff, the biology, especially
286 molecular biology, there was a new molecular biology teacher named Bagshaw (Shindell:
287 Uhm-hmm.) and he ended up becoming my advisor. And, he was working on the brine
288 shrimp, artemia salina, which I ended up working on for my masters thesis (Shindell: Uhm-
289 hmm.) with him. That was sort of, you know, I went through (Shindell: Yeah.) the first
290 year was pretty much all class work. You had to get an advisor. The second year was
291 much more research, (Shindell: Uhm-hmm.) doing your, your work for your masters thesis.
292 At the same time, I was working full-time, I got a job at the Michigan Cancer Foundation,
293 which was an independent cancer lab downtown near the university, (Shindell: Uhm-hmm.)
294 and I got to augment my income. I needed money to live on. I got a full-time job as a
295 research assistant.

296 **SHINDELL:** So, you were working in two labs at the same time?

297 **BIRNDORF:** Right. So, what I'd do was, I really liked working at night at the school
298 (Shindell: Uhm-hmm.) because there was nobody there, you know. They had limited
299 equipment. Sometimes you had to wait. There were lines, signups for centrifuges
300 (Shindell: Uhm-hmm.) or for scintillation counters, (Shindell: Uhm-hmm.) and things like
301 that, but at night everything was wide open. So, I would usually work during the day and
302 then go into the lab at night and stay until ten or eleven o'clock at night and do my research.

303 **SHINDELL:** Now, did Bagshaw have a lot of students?

304 **BIRNDORF:** No. He had maybe two or three as, where he was their advisor. (Shindell:
305 Uhm-hmm.) He taught classes as well, so he had a class load, but in terms of, of his load in

306 terms of graduate students I think he only two or three.

307 **SHINDELL:** So, you worked pretty closely with him?

308 **BIRNDORF:** Yeah.

309 **SHINDELL:** And, did he have you working in the lab pretty independently? I mean, if
310 you were there at night you were probably not being very supervised?

311 **BIRNDORF:** Yeah. I was very independent. (Shindell: Yeah.) And, we would, same
312 thing, we'd figure out what experiments we were doing and then that may take two or three
313 weeks to do them, and then I'd sit down with him and we'd go through the results.

314 **SHINDELL:** Uhm-hmm. And what were the primary questions you were interested in
315 with the brine shrimp?

316 **BIRNDORF:** We were looking to isolate [polymerases][28:24] from brine shrimp,
317 (Shindell: Uhm-hmm.) DNA [polymerases][28:24] or RNA [polymerases][28:24] and we
318 did, and I wrote my thesis on it, (Shindell: Hmm.) which is actually here somewhere,
319 [Moves away from microphone] I think. I think it's here somewhere. Where is that? Is
320 that it? No. Well, it might be here somewhere. It's probably at home. [Laugh] (Shindell:
321 Uhm-hmm.) Or is it? Is this it? No.

322 **SHINDELL:** So, when you were working on these with the brine shrimp, was this
323 completely different laboratory procedures now than what you had been using with the
324 algae when you were at Oakland?

325 **BIRNDORF:** Yeah. I mean, this was a much more sophisticated lab, (Shindell: Uhm-

326 hmm.) much more, much, you know, a lot more equipment, you know, and same, I was
327 also at the same time working at the Cancer Foundation, which was even more
328 sophisticated. (Shindell: Uhm-hmm.) They were, you know, funded by grants, NIH grants.
329 I was working for Justin McCormick and Veronica Maher, who still (Shindell: Uhm-hmm.)
330 run the Carcinogenic Lab (Shindell: Uhm-hmm.) at Michigan State University right now. I
331 still get the occasional newsletter from them. [Laugh] They are Jesuit priests, he's a Jesuit
332 priest and she is a sister. (Shindell: Uhm-hmm.) They're both PhD scientists, and they've
333 been working as a team for, I don't know, thirty, forty years now.

334 **SHINDELL:** Wow. Did you find it difficult at all to go between the two labs to do
335 different things at different labs?

336 **BIRNDORF:** No. No, I didn't find it difficult. One was a job and, you know, I went in
337 and I did my work and it was similar, you know. (Shindell: Uhm-hmm.) You know, you
338 do, I'd go to Justin and I'd sit down with him and he'd say, "Here's what we're doing," and
339 I'd go do it. And, same, it was sort of similar at graduate school. (Shindell: Yeah.)
340 Although, at graduate school, you know, I had to collate the information for a written
341 paper, which was (Shindell: Uhm-hmm.) published, and also the subject of my, my thesis.
342 (Shindell: Uhm-hmm.) And then, at some point, I had to orally defend that thesis, which I
343 did. So, that was in '72-'73, and . . .

344 **SHINDELL:** It sounds like you had a real knack for work at the bench?

345 **BIRNDORF:** Yeah. I did (Shindell: And that was really . . .) have a pretty good knack
346 for working at the bench, and I, actually started screwing around – one of the first things,
347 first interesting things that I did when I was at the Michigan Cancer Foundation is I thought

348 I had invented something. (Shindell: Uhm-hmm.) I had – we were looking at breast milk
349 to see if there was a virus that causes breast cancer, (Shindell: Uhm-hmm.) and I, I had, I
350 put together a, an apparatus to do isoelectrofocusing, which moved, moves particles in
351 electric field to their neutral point (Shindell: Uhm-hmm.) and focuses them there, and then
352 if they focus there then you can find them. (Shindell: Uhm-hmm.) So it's a nice . . .

353 **SHINDELL:** Sounds sort of like gel electrophoresis?

354 **BIRNDORF:** Yeah. It was like gel electrophoresis, only in a different, a matrix of
355 particles, (Shindell: Uhm-hmm.) in a big cylinder. (Shindell: Uhm-hmm.) And then I put
356 electrodes on the end (Shindell: Uhm-hmm.) and I made this apparatus and we tested it and
357 we were looking to see if we could find a new virus that may cause breast cancer. And, I
358 actually took that, I was using as the particles a product that was made by Bio-Rad, a
359 company that's in Richmond, California, and I actually called them up and a guy came and
360 looked at this. (Shindell: Uhm-hmm.) I was thinking that I might be able to sell this
361 through them, this device that used their particles.

362 **SHINDELL:** Did you know anything at that point about patenting or anything involved
363 with sort of thing?

364 **BIRNDORF:** Nothing.

365 **SHINDELL:** No?

366 **BIRNDORF:** Nothing. I called this guy – I can't remember – the guy came out, he took
367 me to dinner. We, he came and he looked at this thing and I think they ultimately decided
368 that they didn't want to do it. (Shindell: Uhm-hmm.) But, it was pretty exciting for me. I

369 was thinking this might be a way to make money, (Shindell: Uhm-hmm.) duh, duh, duh,
370 duh. At the time I was making, I don't know, \$10-\$12,000 a year at the Cancer Institute,
371 (Shindell: Uhm-hmm.) plus a few bucks at the school. And, I'm trying to remember the
372 sequence of events. What happened then was I, I was finishing up my thesis and I was
373 trying to decide whether or not I should continue on to get a PhD. (Shindell: Uhm-hmm.)
374 And, I actually started taking extra courses and it was in, it was in – so I went – let's see. I
375 went, I started in September '71, (Shindell: Uhm-hmm.) to September '72, to September '73,
376 and I actually continued after September of '73 I, I was basically done (Shindell: Uhm-
377 hmm.) and I stayed on at the Cancer Foundation and I was still, I decided to continue to
378 take classes and I started taking classes. I was still working in Bagshaw's lab, (Shindell:
379 Uhm-hmm.) and in September '73 my father had a major heart attack. No, September of
380 '74. Sorry. September of '74. (Shindell: Uhm-hmm.) September of '71 to two, to three,
381 that's right, to four. September of '74. I actually stayed another year. I was taking classes,
382 (Shindell: Uhm-hmm.) I was in my third year, I was working at the Cancer Foundation, and
383 in September of '74 my father had a major heart attack (Shindell: Uhm-hmm.) and he
384 almost died. And, he recuperated September, October, November, December. In
385 December of '74 I was driving – I lived about an hour away from downtown Detroit.
386 (Shindell: Oh.) So, everyday I would . . .

387 **SHINDELL:** So, you did an hour commute everyday?

388 **BIRNDORF:** Forty-five minutes (Shindell: Yeah.) to an hour commute, depending on the
389 traffic. Some days it was longer. And, in December of '74 I was driving down to the
390 Cancer Foundation. It was in a huge snowstorm. I was on the Lodge Freeway. I was at the
391 Wyoming exit, (Shindell: Uhm-hmm.) and I remember going, "Why am I doing this? What

392 am I doing here? This is crazy. I've got to get out of here." (Shindell: Uhm-hmm.) And,
393 that week, I don't know what happened but that week I went in and I gave notice at my job
394 and I gave notice at the, I told them at school that I was done, (Shindell: Uhm-hmm.) and
395 two weeks later in January of '75 I picked up with, I sold my car, I picked up with my dog,
396 my cousin who wanted to go with me, she was going to California. (Shindell: Uhm-hmm.)
397 We got a drive-away car, where they paid us \$300 to drive a car from Detroit to San Jose,
398 (Shindell: Uhm-hmm.) her dog, my dog, and her and I got in this car and drove, started
399 driving from Detroit to San Jose in January '75, (Shindell: Uhm-hmm.) and I just decided I
400 just couldn't continue doing what I was doing and it was time to leave, (Shindell: Uhm-
401 hmm.) and I just did. And, that was sort of the end of Detroit. [Laugh]

402 **SHINDELL:** Yeah. So, you had no idea what you wanted to go do at that point?

403 **BIRNDORF:** I had no idea what I wanted to go do. I knew I wanted to take a break.
404 (Shindell: Uhm-hmm.) I basically didn't start work again until the end of '75. (Shindell:
405 Uhm-hmm.) I started working at Stanford in December of '75. So, basically took the
406 whole year of '75 off. I was getting unemployment from the Cancer Foundation,
407 unemployment checks of, I think it was \$94 a week, during that year. (Shindell: Uhm-
408 hmm.) And, I just, I had a bunch of friends that were involved in this commercial store
409 called Roots. They sold, they're still around. They sell high-end leather goods and
410 (Shindell: Uhm-hmm.) shoes. And, they opened a store in Berkeley in San Francisco, and
411 in Palo Alto. And, they were close friends of mine from Michigan. And, I came out and I
412 basically would move around between those three guys and (Shindell: Uhm-hmm.) stay
413 with them, and I was, how old was I, I was twenty-four. I turned twenty-five that year,
414 (Shindell: Uhm-hmm.) and that, that was what I did. I took the whole year off and then in

415 December I went and, around probably October or November I started looking for a job,
416 (Shindell: Uhm-hmm.) and I interviewed at UCSF, Berkeley, and Stanford, and I took a job
417 at Stanford.

418 **SHINDELL:** And you decided at that point to look for a job and not, (Birndorf: In
419 science.) not a PhD program?

420 **BIRNDORF:** Well, it's funny, because one guy who was working in I think it was sickle
421 cell – I'm not sure I can remember – but one guy offered me a job and a doctorate program
422 at (Shindell: Uhm-hmm.) UCSF, and I think I turned it down in favor of the job at Stanford
423 that was in breast cancer, in the Oncology Division (Shindell: Uhm-hmm.) with a guy that
424 specialized in breast cancer. And for some reason I was just intrigued by the whole cancer
425 thing.

426 **SHINDELL:** So, it was the problem that chose you to choose?

427 **BIRNDORF:** You know, I don't know.

428 **SHINDELL:** Or, led you to choose?

429 **BIRNDORF:** Maybe it was the problem. Maybe it was Stanford. Maybe it was (Shindell:
430 Uhm-hmm.) going to Palo Alto, moving to Palo Alto as opposed to San Francisco.
431 (Shindell: Uhm-hmm.) I'm not sure but the guy did offer me a program where I could get a
432 PhD as well as work in his lab. It turned out the guy was quite famous. I didn't know this
433 at the time. I think his name was Kahn, or something. And, whatever he was doing he was
434 pretty good at. I found that out later.

435 **SHINDELL:** Uhm-hmm. Did it take you a while to get used to life in the Bay Area

436 compared to Michigan? Or, did you sense that there was any sort of difference in the
437 culture there?

438 **BIRNDORF:** Well when, in 1970 I took a six-week trip and I, well let's see. Was that in
439 '70 or '72? I took, had taken two trips to California prior to 1975. (Shindell: Uhm-hmm.) I
440 did a trip in the summer of '70 with some friends. We drove in a Volkswagen camper
441 [Laugh] from Detroit to Berkeley. And, that was like a two-week trip, (Shindell: Uhm-
442 hmm.) and I was just enthralled by California, by the Bay Area. (Shindell: Uhm-hmm.) It
443 was just fabulous. And, I had friends out there and I was really, loved it. But, that was just
444 a two-week trip. Then in '72 I took a much longer trip. I took about a six-week trip and I
445 went to Chicago and then to Aspen, and then to California, and then came back and that
446 was about a six-week thing, and I really loved California at that point. (Shindell: Uhm-
447 hmm.) And then three years later, roughly, '72, three, four, two and a half years later I
448 ended up wanting to go there for good. (Shindell: Uhm-hmm.) Well, Detroit is very
449 different than here. (Shindell: Uhm-hmm.) I'm trying to think did it take me to get used to
450 it? It didn't really. I sort of took to it. (Shindell: Yeah.) I don't know, it didn't seem . . .

451 **SHINDELL:** Was there anything particular, in particularly different about say the work
452 culture on the West Coast versus the East Coast?

453 **BIRNDORF:** Well, I always felt that the work culture on the West Coast was not as
454 diligent as the work culture on the East Coast, for some reason. (Shindell: Uhm-hmm.)
455 Maybe it's the weather. Down here it seemed always that the surfing thing (Shindell: Uhm-
456 hmm.) that kind of thing. I'm not saying that's absolutely true, [Laugh] but it seemed like
457 that to me at the time. Palo Alto took some getting used to (Shindell: Uhm-hmm.)

458 compared to San Francisco. Palo Alto was, you know, it was all very wealthy, (Shindell:
459 Uhm-hmm.) all concentrated in a small area, and if you were not wealthy and you were,
460 you know, I was, I don't remember what I was making probably \$12,000, \$1,000 month or
461 something and I rented rooms in different places and shared houses and it was, it was fun
462 years, (Shindell: Yeah.) but it wasn't – and, the stuff at Stanford was pretty interesting.
463 That's how I really got involved. I met Ivor at Stanford. I got involved with hybridoma
464 research at Stanford (Shindell: Uhm-hmm.) when it first came to this country. That's, I
465 started doing hybridomas in the lab, you know, (Shindell: Uhm-hmm.) physically doing
466 them myself. I became good at doing it. It's one of the reasons Ivor asked me to go, come
467 down here with him (Shindell: Uhm-hmm.) was because I knew how to do this stuff.

468 **SHINDELL:** But, how did you learn that particular sort of expertise?

469 **BIRNDORF:** I just, this guy had gone, Hertenberg went to the lab in England, and
470 (Shindell: Uhm-hmm.) Millstein's lab, and learned how to do it on his sabbatical. When he
471 came back he taught his, his associate in his lab, this girl that I knew, (Shindell: Uhm-
472 hmm.) and she taught me. Basically, that's how, you know . . .

473 **SHINDELL:** So, it went from sort of person to person?

474 **BIRNDORF:** Yeah. It was sort of watching and then doing it yourself, and it was fairly
475 intricate but not impossible, you know. (Shindell: Uhm-hmm.) It wasn't that difficult to
476 do. It was, you know, it just took some skill.

477 **SHINDELL:** If I could ask you sort of a vague general question. (Birndorf: Yeah.) Do
478 you think that generally that is how you learned bench science, is from other people doing
479 it, and watching them, and having them instruct you or were you able to learn also by

480 reading articles? How do you think that laboratory expertise is passed down?

481 **BIRNDORF:** For me it was absolutely the prior rather than the latter. (Shindell: Uhm-
482 hmm.) I don't, you know, it's very difficult to – I mean, you had to do it sometimes. If you
483 wanted to find a technique, for example – back then. It's so different now, (Shindell: Uhm-
484 hmm.) because everything is so computerized now. Back then it was all manual. You did
485 all your pipetting, (Shindell: Uhm-hmm.) and it was much more manual than it is today.
486 But back then the primary way was somebody to show you how to do something. If you
487 wanted to use a new technique and say use the new machine that you had never used
488 before, (Shindell: Uhm-hmm.) somebody would show you how to do that. You had to read
489 about the technique though, initially. (Shindell: Uhm-hmm.) Usually it was in a paper that
490 did something that you wanted to do and you, and you'd have to read what they did
491 (Shindell: Uhm-hmm.) and figure out how to do it yourself. But, if that required using
492 equipment or doing things that you had never done before you usually searched out
493 somebody who knew how to do it and asked them to show you.

494 **SHINDELL:** So, you would say it's pretty important to be a part of, say, a network of
495 people with different skills and to sort of have people around or available who have that
496 sort of expertise? Like, it would be pretty hard to work in isolation?

497 **BIRNDORF:** Well, it surely saves time.

498 **SHINDELL:** Yeah.

499 **BIRNDORF:** I mean, I'll give you an example of something that I did that was really
500 bizarre. When I was working at the Michigan Cancer Foundation (Shindell: Uhm-hmm.) I
501 had to go do a spin in an ultra centrifuge, (Shindell: Uhm-hmm.) and I had never used this

502 particular centrifuge before and I got the rotor and I loaded my samples and then I put the
503 tops on and I put it in the centrifuge and started it up (Shindell: Uhm-hmm.) and about a
504 minute later there's this [sound effect] [Laugh] and I stopped it. I shut it down and the rotor
505 was cracked. (Shindell: Hmm.) So, everybody said, "Oh, crap. That, you know, it must
506 be metal fatigue or something." (Shindell: Hmm.) So, they got another rotor and then I
507 did, loaded it up, put the tops on, put it in, started it up and about a minute later [sound
508 effect], and I pull it out and they said, "Well, this can't be two rotors in a row." And, it
509 turns out that whoever had showed me how to do it (Shindell: Uh huh.) is either I didn't,
510 nobody showed me. We don't really know. [Laugh] But, I put the tops on wrong.
511 (Shindell: Oh.) I put them on backwards, or, I don't remember. Something like that. And,
512 because they were on wrong it screwed the whole thing up. And, I remember being called
513 down to the director's office and he said, you know, he was really pissed because these
514 things [Laugh] were like ten grand apiece (Shindell: Yeah.) and I think I just screwed them
515 both up. And, I thought I was going to get fired but I didn't, but he just said, "Before you
516 ever do anything again make sure you know what you're doing," (Shindell: Uhm-hmm.) or
517 something like that. So. So, I think it's very important for people, especially on equipment
518 and things like that, it's one thing, you know, if it's a technique of adding, of making a
519 buffer for example, (Shindell: Uhm-hmm.) it's pretty easy to read about that, measure the
520 things out, make it yourself. But, if a technique, if it's something that requires you using a
521 piece of equipment that you've never used before . . .

522 **SHINDELL:** Then it's particularly . . .

523 **BIRNDORF:** You clearly, particularly (Shindell: Yeah.) important that rather than just go
524 trying to figure it out yourself that it's much easier, it saves time (Shindell: Uhm-hmm.) and

525 potentially disasters [Laugh] to get somebody to show you how to do it.

526 **SHINDELL:** Uhm-hmm. So, during this time you're building up your expertise with
527 hybridoma research and also with monoclonals, is that right?

528 **BIRNDORF:** Yeah. Well, they make monoclonals.

529 **SHINDELL:** Oh, right. They're related to each other.

530 **BIRNDORF:** Yeah.

531 **SHINDELL:** And, this is also the time that you met Ivor Royston?

532 **BIRNDORF:** Yeah.

533 **SHINDELL:** And, can you tell me how that collaboration began? He was working in a
534 different lab, is that right?

535 **BIRNDORF:** Yeah. So, I was working in this one lab and we were working on DNA
536 [polymeration][47:16] in breast cancer, and then he was, he was, he was a doctor already
537 and he was doing a fellowship in oncology but he wanted to do research as well, (Shindell:
538 Uhm-hmm.) and he was working in another lab. A guy named Ron Levy, who we ended
539 up started IDEC with (Shindell: Uhm-hmm.) several years later. Well, about ten years
540 later, eight years later, but Ron Levy was involved with lymphoma. (Shindell: Uhm-hmm.)
541 So, there was Ivor was in Ron's lab. They were in lymphoma. And, I was in Frank's lab
542 and he was with breast cancer. And, I'm not sure exactly how it happened, but I used to go
543 up to Ron's lab for something – I'm not sure how, I don't remember how it all transpired but
544 I used to hang out there (Shindell: Uhm-hmm.) for somehow – I think I might have been

545 dating one of the girls that (Shindell: Ah.) or seeing. I don't remember. But, somehow I
546 met Ivor and we, we were talking and somehow there was a collaboration. I talked to
547 Frank and they said, you know, "We want to see about doing these monoclonals," and there
548 was a guy named Bertino there who, who was formerly head of the NCI. I can't think of his
549 first name. He was really a good guy and Ivor really looked up to him. (Shindell: Uhm-
550 hmm.) So, I was meeting all these people, these very famous people, and being involved
551 with this cutting-edge science that was really exciting. Ivor wanted to, Ivor was more
552 interested in leukemia than lymphoma, (Shindell: Uhm-hmm.) so while Ron was
553 concentrating on using monoclonals for lymphoma Ivor wanted to do some stuff for
554 leukemias, (Shindell: Uhm-hmm.) and I think he and I cooked up some experiments where
555 we were sort of coming in after hours and doing some stuff. Nobody really cared. I mean,
556 it was all good science and things like that. (Shindell: Uhm-hmm.) We used to go down
557 and find patients in the wards and we'd get blood and things so we could get the cells to
558 make the, do the hybridoma studies and things like that. (Shindell: Uhm-hmm.) So, you
559 know, it was, it was sort of a collaborative, you know, it's really how good science is done.
560 (Shindell: Hmm.) That's the real way that science gets done, is sort of talking at the water
561 cooler. (Shindell: Uhm-hmm.) [Laugh] You know.

562 **SHINDELL:** Sort of informal conversations? (Birndorf: Yeah.) Hallway meetings, that
563 sort of deal?

564 **BIRNDORF:** That's exactly what was going on. (Shindell: Uhm-hmm.) Exactly what
565 was going on. You'd find out about this hybridoma thing and all of a sudden you think
566 about, "Well, maybe we could do this with that?" (Shindell: Uhm-hmm.) And then, well,
567 you got to learn how to do it first, and so we start learning how to do it and then, you know,

568 that's really the way it was. (Shindell: Uhm-hmm.) And, you know, I was, what, twenty-
569 five and twenty-six, and Ivor's older than me. I don't know how old, much older. He's
570 probably seven or eight years older than me.

571 **SHINDELL:** Uhm-hmm. So, you two had a pretty friendly relationship in addition to the
572 collaborative relationship?

573 **BIRNDORF:** Yeah. I mean, I used to go over to his house every now and then, you
574 know. We'd have lunch together, occasional dinners. (Shindell: Uhm-hmm.) I became
575 friends with his then girlfriend. I introduced him to his now wife. Yeah, we were friends,
576 and (Shindell: Yeah.) but, you know, and he wasn't my boss at that time. We were just
577 friends, (Shindell: Uhm-hmm.) but we were collaborating on some science together.
578 (Shindell: Uhm-hmm.) Then, when he got his job – his fellowship was up. This was in '77
579 now, so I'd worked there for about a year and a half. I started there in (Shindell: Uhm-
580 hmm.) December of '75. I worked there a year, almost a year and a half, and sometime in
581 the spring of '77 he had gotten a job down here as assistant professor at UCSD (Shindell:
582 Uhm-hmm.) and he was going to be given a 200-square-foot lab and some money to, you
583 know, equip the lab, and he needed to hire, hire somebody, and he said, asked me if I
584 wanted to come down here with him and (Shindell: Uhm-hmm.) run the lab down here.

585 **SHINDELL:** Let's pause for a second. It's been . . .

586 **BIRNDORF:** Yeah, I've got to use the restroom.

587 **SHINDELL:** It's been about fifty-one minutes now, so you, if this is a good time to
588 (Birndorf: Good time.) wrap up for today. I'm just, you know, don't want you to be late for
589 your lunch.

590 **BIRNDORF:** That's fine.

591 **SHINDELL:** Okay.

592 **BIRNDORF:** Yeah. I do have to get, I just want to do a few things before I leave.

593 **SHINDELL:** Okay. Well then, that's the end of interview one with Howard Birndorf.

594 END PART 1 OF 2 [51:55]



THE SAN DIEGO TECHNOLOGY ARCHIVE

INTERVIEWEE: Birndorf, Howard
INTERVIEWER: Shindell, Matthew, Historian,
INTERVIEW: Part 2 of 2
DATE: 8 May 2008
LOCATION: San Diego, California

595 **SHINDELL:** This is interview number two with Howard Birndorf. It is May 9, 2008.
596 The interviewer is Mathew Shindell. One question that I wanted to ask you, you may not
597 have thought at all about the interview that we did before, since we did it, but in case you
598 had I wanted to ask you if anything had occurred to you since then that, you know, the
599 interview, where recalling that sort of stuff had, had sort of brought up for you? If there's
600 anything you feel like you didn't say or . . .

601 **BIRNDORF:** No, actually, I didn't really think about it [Laughter] much, frankly. I
602 haven't . . .

603 **SHINDELL:** I'm sure you're pretty busy.

604 **BIRNDORF:** I've been pretty busy since then (Shindell: Yeah.) yeah. No, I haven't
605 thought of anything else.

606 **SHINDELL:** Okay. Well, fair enough. Then, when we left things last week we were at

607 the point where you had met Ivor Royston at Stanford and you had begun working with
608 monoclonals and you two had, I think, just moved down here to San Diego (Birndorf:
609 Yeah.) when we stopped.

610 **BIRNDORF:** I think we were just, that's where we left off. As I mentioned previously,
611 Ivor had gotten a job as an assistant professor at UCSD and at some point he asked me if I
612 wanted to move to San Diego and be his laboratory assistant, his research associate, at his
613 lab. And, I said, "Okay." And, I remember it was in, I took a trip down here sometime like
614 around March of 1977 and found a place to live, a little, the bottom half of an A-Frame up
615 in Leucadia. That was right on, right on the beach road. I wasn't on the cliff side but I was
616 on the other side of the street. And I, I packed up all my things, which weren't much, and I
617 had, I still had my dog (Shindell: Uhm-hmm.) that I had come out from Detroit with, Geeks
618 Romo. He was a great dog.

619 **SHINDELL:** What was his name?

620 **BIRNDORF:** Geeks Romo. [Laugh]

621 **SHINDELL:** How did you come up with that?

622 **BIRNDORF:** That was some, it was the name of some, some character in a parody, some
623 comic parody that I had seen when, sometime in college and I just liked that name.

624 [Laugh] And I, I packed up my Chevrolet Vega. It was fort of a real ugly green Vega,
625 light green, and I remember I drove down from Palo Alto to San Diego. It was right
626 around, right before, I think it was the weekend before Fourth of July weekend in 1977.
627 (Shindell: Uhm-hmm.) I remember driving down Highway 5 and I still remember the
628 feeling of going through L.A., and getting down past L.A. into Orange County, and then

629 hitting, when I hit the stretch between San Clemente and Oceanside, (Shindell: Uhm-hmm.)
630 that stretch of the Army, the Marine base, (Shindell: Uhm-hmm.) Camp Pendleton where
631 the highway's right on the ocean and, and you know, there's this ocean smell. And, it was
632 like this outside, it was gloomy. It was in June. I remember pulling into this, into
633 Leucadia. Leucadia back then was a real sleepy little village. (Shindell: Uhm-hmm.) It
634 was not nearly what it is now thirty years later. And, I pulled into this little A-Frame and
635 brought my stuff in, and it was really something. It was so different than the Bay Area
636 (Shindell: Uhm-hmm.) and Palo Alto. And, I remember that, you know, I didn't, I don't
637 know when I started work but I had some time off, a few weeks anyway, and I was just
638 acclimating myself to the area. I didn't, I knew one person down here, a friend of mine
639 from Michigan and his wife lived here. And, I got my stuff together and started diving
640 down here. (Shindell: Oh yeah?) I went abalone diving, and stuff, in those days. And
641 then, finally I met Ivor at the, our lab turned out to be in the VA Hospital, (Shindell: Uhm-
642 hmm.) not in the university labs, but the university had a deal with the VA Hospital. So,
643 they had joint appointments and things.

644 **SHINDELL:** Uhm-hmm. Before, before you tell me what it was actually like there,
645 (Birndorf: Yeah.) did you have any expectations of what you would see when you got
646 there?

647 **BIRNDORF:** No.

648 **SHINDELL:** Did you think this would be a step up from the lab that you'd been working
649 in at Stanford?

650 **BIRNDORF:** I had no idea. But you know, Stanford Medical Center was pretty cool,

651 (Shindell: Uhm-hmm.) and it was very modern. It was cramped quarters. Everybody's
652 cramped at Stanford because of the demand there, obviously, but nonetheless the labs were
653 pretty nice. And, I came down, [Laugh] I remember driving down and getting into the VA,
654 and going up to the fifth floor, (Shindell: Uhm-hmm.) which is the top floor. Our lab was
655 half the size of this office. Literally, if you put a wall down the middle, it would be from
656 the doorway to the window, (Shindell: Uhm-hmm.) that was it. It was a 200-square-foot
657 lab. It had a bench along one side and that was it. (Shindell: Uhm-hmm.) It was an empty
658 room with a bench and, I think, a hood. And, I was pretty amazed at the lack of space and
659 the (Shindell: Uhm-hmm.) small area that we had. It had a telephone in it. And, my job
660 was to go and start ordering all the equipment we would need, and chemicals, and whatnot.
661 And I, that's what I did. I sat down and I, and I started doing that and actually during that
662 process I made one, a contact that turned out to be a very good contact and a long lasting
663 contact. What I did was I called all of the laboratory supply houses. At the time there were
664 three. There was VWR, Fisher, and Scientific Products, and I had each one of the reps
665 meet me and I explained to him what I needed, (Shindell: Uh huh.) you know, my list of
666 equipment and things, and I had them bid on the best price. And, the guy from Fisher was
667 this really cool guy who, (Shindell: Uhm-hmm.) where I became, I'm still friends with to
668 this day. In fact, I spoke to him yesterday. And, he was the one that not only was the
669 nicest guy but gave me the best price, and that turned into a long-term relationship with him
670 and Fisher Scientific. (Shindell: Uhm-hmm.) But, so that's how I did it. I got, I got the
671 best price on all the stuff.

672 **SHINDELL:** And, do you think that that's something that labs routinely did or was that
673 something that you innovated?

674 **BIRNDORF:** I don't know if I innovated it, but what I, I think I did innovate things in a
675 way. Because, what I ended up doing was, I ended up, this long-term relationship with
676 Fisher turned into a buying group, (Shindell: Uhm-hmm.) which I ended up getting a
677 number of other labs involved and then over the years became much bigger. Because, as I
678 would start companies I would get Fisher involved very early on (Shindell: Uhm-hmm.) to
679 outfit the company and then they got the business, and the more business they got the better
680 prices we got. And, at one point I was one of Fisher's largest customers because I had a
681 huge number of groups buying from them (Shindell: Uhm-hmm.) in Southern California.

682 **SHINDELL:** And, they were pretty in tune with, with your needs, your lab needs?

683 **BIRNDORF:** Well, they, that was what – I made them drive to give me good service
684 (Shindell: Uhm-hmm.) and good pricing. And, I don't know if that was unique, but I do
685 know that I think, you know, this was one of the things that I did well. (Shindell: Uhm-
686 hmm.) You know, the things that I think I do well is I had this real sense of urgency back
687 then and also I was very in tune with trying to get things right but get them at good pricing,
688 good deals, (Shindell: Uhm-hmm.) that, sort of like my father did, in a sense. I mean,
689 (Shindell: Uhm-hmm.) I had some of the genetics, I think. [Laugh] In any event, we set
690 up the lab and we started working. Finally got the lab set up to the point where I could
691 actually do experiments and we started making hybridomas. (Shindell: Uhm-hmm.) The
692 area that we were working on, again, was more leukemia as opposed to Stanford, which
693 was lymphoma, (Shindell: Uhm-hmm.) and Ivor's interest was more in leukemia. And we,
694 we, you know, the VA was a very good source of getting patients that had these diseases,
695 (Shindell: Uhm-hmm.) the ability to get their blood and, and/or other tissues when they
696 had operations, and whatnot, if they had tumors. And, so we had a good source of tissues,

697 and blood, and we, we went to work and we started making these things. And, that was so,
698 that was, you know, mid '77. And then we sort of, I don't know, I don't remember now how
699 long it took but at some point we started to get bigger. I mean we, we, there was more
700 work to do than I could handle and Ivor got more funding. A lot of it had to do with his
701 fund, ability to get funding, (Shindell: Uhm-hmm.) obviously. The university (Shindell:
702 So, by this, by this time . . .) I think gave him startup funding but then he had to generate
703 his own grants. (Shindell: I see.) So, he was, he was putting in grants. I don't know if he
704 got them. I don't remember now. But, at some point we had to hire more people.
705 (Shindell: Uhm-hmm.) So, I think I hired one or two other lab techs. At one point there
706 were three of us. I was in charge of these other two. And, one of the things that was
707 driving me at the time was money. (Shindell: Uhm-hmm.) I was making, my salary, I
708 think, was \$1,000 a month. And, I was working overtime and Ivor was able to get me some
709 overtime (Shindell: Uhm-hmm.) on top of that. So, I think my, by the time I left there in
710 '78 I was making about \$15,000 year (Shindell: Uhm-hmm.) with overtime, but there was a
711 limit to how far I could go with a masters degree and no PhD, (Shindell: Uhm-hmm.) in
712 the VA, in the university system. You know, I was a senior research associate, I believe. I
713 don't remember the title, but I was about as far up the pay scale as I could go (Shindell:
714 Uhm-hmm.) and I couldn't go much further without going back to school or something. So,
715 I was starting to really question and wonder what I could do to make more money in my
716 life. (Shindell: Uhm-hmm.) Whether I should go back to school and finish my doctorate.
717 Whether I should get out of this all together and try to find something else to do. (Shindell:
718 Uhm-hmm.) I really didn't know what to do with myself. So, I was, this was a constant
719 source of aggravation.

720 **SHINDELL:** And, did you talk to Ivor a lot about that at the time?

721 **BIRNDORF:** I did. I talked to Ivor a lot about that and he was quite sympathetic but he
722 was sort of, his hands were tied. (Shindell: Uhm-hmm.) He had no, he wasn't going to pay
723 me out of his pocket, (Shindell: Right.) and he had no – he tried to get me, through this
724 overtime stuff, more money. (Shindell: Uhm-hmm.) I think he did recognize my value.
725 So, at some point, and again this is, I think if you ask Ivor as well, I don't know who
726 initially – I think it was during one of these conversations that the idea of using monoclonal
727 antibodies as a business came up. And, I don't know if it was my idea, because (Shindell:
728 Uhm-hmm.) I was looking for something to do, or whether Ivor suggested it in response to
729 that, but I know that between the two of us this idea sort of germinated, that maybe, that,
730 you know, part of our research involved using commercial antibodies. (Shindell: Uhm-
731 hmm.) And back then, the way antibodies were made was they injected animals, usually
732 sheep or goats, and they would then bleed them and (Shindell: Uhm-hmm.) isolate the
733 antibodies from their blood and then package them and sell them. And so, each goat had a
734 different antibody. The antibody was different from each animal. It was against the same
735 antigen but it had (Shindell: Right.) different properties. Some were stronger, more
736 immunogenic than others. And we, we said to ourselves, "Well, wouldn't it be nice if
737 you could buy an antibody and it was always the same antibody. You never had to . . . "
738 because each time you got a different batch of antibody you had to recalibrate your
739 (Shindell: Uhm-hmm.) experiments to, to accommodate for the fact that that antibody was
740 different than the one you had used previously, even if you were doing the same
741 experiment. (Shindell: Uhm-hmm.) So, we said, "Gee, wouldn't it be nice if you knew
742 that forever you could always get the same antibody. You'd never have to worry about that

743 aspect. They would be standardized and they would be uniform. They'd always be the
744 same," and you could do that with monoclonals. (Shindell: Hmm.) You could make them
745 in the lab instead of using animals. They would be cheaper, faster, and (Shindell: Uhm-
746 hmm.) better. And so, we were mulling this over and we were thinking, "Well, that would
747 be a great, that could be a great idea for a business for using, to sell as research reagents."
748 (Shindell: Uhm-hmm.) You know, there were companies that were doing this. This was
749 not in our minds a gigantic business. You know, it wasn't a Fortune 500 business,
750 (Shindell: Uhm-hmm.) but it was a nice idea for a business. So, Ivor went and bought a
751 book called, "How to Start Your Own Business," and he read it and then he gave it to me
752 and I read it. And we, in there it talked about a business plan. So, we divvied up. I wrote
753 the section on competition. I went and figured out who the other antibody companies were.

754 **SHINDELL:** And was there anyone who was doing anything similar to what you guys
755 were proposing at the time?

756 **BIRNDORF:** As far as we knew, no. (Shindell: Uhm-hmm.) No. We didn't. This was
757 about, at most, two years. Probably a year and a half to two years after monoclonals had
758 come to the United States, (Shindell: Uhm-hmm.) and at most maybe three years since
759 they were invented.

760 **SHINDELL:** And how were people using them primarily?

761 **BIRNDORF:** They were using them in research, (Shindell: Uhm-hmm.) and each lab was
762 doing them, their own. Nobody else was making them commercially.

763 **SHINDELL:** Oh, okay.

764 **BIRNDORF:** And, the lab that had invented the process in England, Kohler and Milstein,
765 had not patented the process. (Shindell: Hmm.) For whatever reasons, they had forgotten,
766 or weren't interested. They ended up winning the Nobel Prize for it, but they didn't patent
767 it. So, we knew we could use it. We also – that was a problem though, we didn't have
768 patent protection, (Shindell: Uhm-hmm.) but we didn't know that at the time. We didn't
769 know that was a problem. Anyway, so we ended up writing this business plan, which I
770 think is, people have copies of. I think I have a copy of it here. It was like six or seven
771 pages long. (Shindell: Hmm.) And, we weren't quite – the budget was \$178,000 for one
772 year, and that was to buy, to rent a space, (Shindell: Uhm-hmm.) buy the equipment, have
773 an employee or two, and start making hybridomas for certain things and start selling them.

774 **SHINDELL:** Uhm-hmm. And, other than the book that Ivor had bought, did you get any
775 advice from sort of – well, were there any real sort of local bio, not biotech, but bio-
776 oriented (Birndorf: No.) businesses (Birndorf: No.) that you could get advice from?

777 **BIRNDORF:** Back then there was, in San Diego I don't think that – there was something
778 called Cal, Cal Biochem (Shindell: Uhm-hmm.) that made reagents, chemicals for biology
779 labs. They were here.

780 **SHINDELL:** So, sort of bio supply companies, (Birndorf: Yeah.) maybe, (Birndorf:
781 There were a . . .) or equipment?

782 **BIRNDORF:** They were a research house, but we didn't go there. I don't remember any
783 other bio-type companies here in San Diego at the time.

784 **SHINDELL:** And, was there anyone else at San Diego who had sort of gone from being a
785 university researcher to starting a company?

786 **BIRNDORF:** Not to my knowledge.

787 **SHINDELL:** Okay.

788 **BIRNDORF:** There may have been, but, and you know the physicists had, throughout
789 World War II (Shindell: Uhm-hmm.) and the chemists for many years had been, but the
790 biologists had never done this. (Shindell: Uhm-hmm.) So the, you know, you can look
791 back in history, the physicists and chemists had developed nylons, and rayons, (Shindell:
792 Uhm-hmm.) and plastics, and the physicists had done their things in atomic energy and in
793 defense contracting (Shindell: Uhm-hmm. Uhm-hmm.) and aerospace. Those areas had
794 all been, been big, so they, I think there were people that were pretty savvy in those areas in
795 terms of intellectual property, and funding. But, venture capital was fairly new.

796 **SHINDELL:** Uhm-hmm. Especially in San Diego?

797 **BIRNDORF:** Well, there was none in San Diego. (Shindell: Yeah.) But, I just read an
798 article in the paper the other day about the, they say the guy that really started venture
799 wasn't, was this guy in Boston. God, what was his name? I just read this. There's a new
800 book out about this guy. (Shindell: Uhm-hmm.) It just came out. And, he apparently was
801 the first, he was in the computer area. He started a company. Maybe it was DEC, Digital,
802 that turned into DEC Digital or something like that. (Shindell: Uhm-hmm.) But, venture
803 capital was very new. There were other biotech companies in California at the time.
804 Genentech had started in '75, (Shindell: Okay.) and Cetus had started even before that. So,
805 at least those two. Of course, we were aware of Genentech only because of reading about it
806 in the newspapers or wherever, but, and in fact that turned out to be a big, a big deal for us
807 as you'll (Shindell: Uhm-hmm.) see in the story, because we ended up going to the venture

808 firm that started Genentech to talk to them and that's who ended up funding the deal,
809 Kleiner Perkins. (Shindell: Uhm-hmm.) But, in the meantime we didn't know what to do
810 with this business plan. We didn't talk to anybody because we didn't know who to talk to.
811 And, it was just Ivor and I discussing maybe how we might get this funding. (Shindell:
812 Uhm-hmm.) So, one of the things I did was I took a trip and I took this plan and I took it to
813 friends of my parents and friends of friends that I knew. I knew a guy who was a doctor
814 who, in Chicago, who ended up basically giving up his, his medicine and became a
815 commodities trader on the Chicago Mercantile. [Moves away from microphone] And, I
816 had met a number of his friends over the, you know, when I was in college and they were
817 all pretty wealthy people, [Closes cabinet door] at least to my mind. And, I took a trip to
818 Chicago and talked to them about this idea. (Shindell: Uhm-hmm.) And, I sat down with
819 them and I explained, tried to explain to them this idea of making, taking these
820 monoclonals and making them commercial. Nobody had a clue what I was talking about. I
821 mean, these guys, this was about as far away – I might have been talking about, you know,
822 in a different language. (Shindell: Uh huh.) They really didn't understand it.

823 **SHINDELL:** Could you describe maybe a typical reaction?

824 **BIRNDORF:** A typical reaction was, you know, "You're a great guy. We, you know, we
825 think you, you know, you have the wherewithal to do something, but we just don't
826 understand what this is all about and it's probably better if you could find somebody that,
827 that did." [Laugh] I tried to take it to some friends of my parents. I had this schoolmate
828 whose father was wealthy. I took it to him. (Shindell: Uhm-hmm.) Nobody was
829 interested in putting up \$178,000 to fund this business opportunity. And, so quickly I was
830 out of ideas on who to take it to. And, it turns out, and I actually think that I'm the one who

831 thought of this but I don't know for sure, it turns out that the woman that I had introduced
832 Ivor to on the ward, that ended up being his girlfriend, (Shindell: Uhm-hmm.) and then his
833 wife, and moved down here with him to, to San Diego from Stanford, named Collette,
834 (Shindell: Uhm-hmm.) she had previously dated Brook Byers, who was now a partner at
835 Kleiner Perkins Caufield & Byers. (Shindell: Uhm-hmm.) And, they had invested in
836 Genentech. And somehow, this, we knew that, I knew or some, somehow we knew that
837 Collette knew Brook (Shindell: Uhm-hmm.) and I suggested to Ivor, or I don't remember,
838 but somehow the idea came up that maybe Collette could call Brook and ask Brook if he
839 would meet with us (Shindell: Uhm-hmm.) so we could show him this idea. And, that
840 happened. She called him. Ivor was going to San Francisco for some meeting. I wasn't
841 there. He went and met with Brook, (Shindell: Uhm-hmm. Uhm-hmm.) and showed him
842 our idea, and he came back and Brook was interested. So, sometime thereafter Brook and
843 his partner Tom Perkins came down to San Diego and met with us. [Sound]

844 **SHINDELL:** Sorry. That's the camera.

845 **BIRNDORF:** Oh.

846 **SHINDELL:** You don't mind if I take the picture now do you?

847 **BIRNDORF:** Well, I'd just as soon not have this [Referring to cigarette] in the . . .

848 [Laugh]

849 **SHINDELL:** Okay. Well, I can wait then.

850 **BIRNDORF:** Brook came down with his partner, Tom Perkins, and we talked. We had a
851 meeting and we talked about, they came and looked at the lab, which at that point was two

852 of these two hundred, we had expanded into two or three of these 200-square-foot modules.
853 But, we had hybridomas up and running in the lab. We showed them. And, you know,
854 they were quite interested. And, in fact, what they said was, you know, "We want to do
855 some homework on this." But, I don't remember if it was that first meeting. I don't think it
856 was. I think they came down a second time. They came down a second time and we ended
857 up taking them to the airport. (Shindell: Uhm-hmm. Uhm-hmm.) We sat in the bar at
858 Lindbergh Field and that's where they offered to fund us. (Shindell: Uhm-hmm.) Not only
859 did they offer to fund us the \$178,000, but they offered to fund \$300,000.

860 **SHINDELL:** Oh wow.

861 **BIRNDORF:** That's the first time I, the first and last time I've ever gotten more money
862 [Laugh] than I asked for.

863 **SHINDELL:** And so, did they expect more for that money?

864 **BIRNDORF:** No. They just said, "Typically people underestimate how much money they
865 need, (Shindell: Hmm.) and so we'll give you more money than you guys thought." The
866 thing that was a negative for me was, Ivor was the MD, Stanford, (Shindell: Uhm-hmm.)
867 Johns Hopkins guy. I was the research associate. Ivor got three times more stock than I
868 did, even though our original deal, he and I, had agreed that we would split this fifty-fifty.
869 (Shindell: Uhm-hmm.) And, the reason, in fact at some, one point it was even more than
870 fifty-fifty because it was agreed that I would leave the university and go and do this,
871 (Shindell: Uhm-hmm.) and Ivor would not leave the university. He did not want to give up
872 his professor, he was an associate professor, assistant or associate professor at the time. He
873 did not want to leave the university. (Shindell: Uhm-hmm.) And, even when we started

874 Hybritech he did not leave the university. He was a consultant. He was on the Board of
875 Directors and a consultant. So, he was on the Board of Directors. [Jet plane in
876 background] I was not. He got much more stock than I did. (Shindell: Uhm-hmm.) And,
877 I remember arguing with Brook a number of times about that, and they were adamant. I, I
878 was an unproven entity and I was quite upset about that. But, on the other hand, I think I
879 started at \$30,000 a year, so it was double my salary. And so, in the final analysis I
880 believed that, you know, "What could I lose (Shindell: Yeah.) by doing this?"

881 **SHINDELL:** Did it cause any tension in your working relationship with Ivor?

882 **BIRNDORF:** Yeah. We had, we had a number of arguments. I was quite pissed about
883 this. (Shindell: Uhm-hmm.) Anyway, between the time they agreed to do it and the time
884 we actually did it was a number of months, because they said they wanted to do due
885 diligence and they wanted to bring in some consultants. (Shindell: Uhm-hmm.) They
886 brought in an intellectual property attorney. It was a guy from Lyon & Lyon, which was a,
887 it no longer exists today but it was a big intellectual property firm out of L.A. (Shindell:
888 Uhm-hmm.) They brought in a guy named Tom Sparks, who's a corporate attorney from
889 San Francisco. And we, to this day we still have relationships with all these people.
890 (Shindell: Uhm-hmm.) And, I remember we had a number of meetings between the time
891 when they agreed to do the deal and the closing, which was in September of – we closed
892 September 18, 1978, this was. [Moves away from microphone] (Shindell: Okay.) Yeah,
893 here it is. Ah. Here's the book.

894 **SHINDELL:** Is that a ledger? It looks that way.

895 **BIRNDORF:** This was the closing documents.

896 **SHINDELL:** Oh, okay.

897 **BIRNDORF:** October 18, 1978 (Shindell: Hmm.) was the closing. [Back at microphone]

898 **SHINDELL:** That looks like a pretty large document.

899 **BIRNDORF:** These were all of the closing documents of Hybritech. And, yeah, it was
900 300,000 shares of preferred. They got \$1 a share, (Shindell: Uhm-hmm.) \$300,000, and
901 115,000 shares of common, of which I got 30,000 and Ivor got 85,000. So, this was the
902 document. So anyway, between October, between when we agreed to the deal in June and
903 October we had a number of meetings here in San Diego, (Shindell: Uhm-hmm.) like at
904 Ivor's house. I remember us sitting around and we were talking about the intellectual
905 property. We were talking about the corporate structure. We were talking about other
906 kinds of applications for monoclonals. They actually broadened out our idea (Shindell:
907 Hmm.) from just research, selling research products to clinical diagnostics, and even
908 beyond that to therapeutics. (Shindell: Uhm-hmm.) Although, we started the company
909 primarily for research and clinical diagnostics we did ultimately get into therapeutics as
910 well, (Shindell: Uhm-hmm.) over time. [Camera noise]

911 **SHINDELL:** And so, a lot of this stuff must have been very new to both you and Ivor?

912 **BIRNDORF:** Exactly.

913 **SHINDELL:** I can imagine . . .

914 **BIRNDORF:** They told us that neither one of us would be the president.

915 **SHINDELL:** Right. But, I can imagine these interactions maybe being, you know, sort of

916 like a clash of two worlds, the business world and then the (Birndorf: It was exciting as
917 hell.) sort of the lab world? Yeah.

918 **BIRNDORF:** It was so exciting for me to be exposed to this stuff. And Brook Byers, who
919 was a young guy, he's like, he's like five years older than me, so 58, he's 63, back then I was
920 twenty-eight, so he was thirty-three. (Shindell: Uhm-hmm.) He was thirty-three years old.
921 He had been apprentice venture capitalist at Asset Management and then he moved over to
922 Kleiner (Shindell: Uhm-hmm.) like the year, right when he met us. [Moves away from
923 microphone] This was his first deal. And, he was an amazing guy because he allowed me
924 the freedom to do things I had never done before. He sort of – I don't know if it was trust
925 or just the way he worked, but even though they all agreed that Ivor and I both had no
926 experience in this area and that Ivor was the name guy and got more stock, (Shindell:
927 Uhm-hmm.) I was the guy that was actually going to be running the thing, at least initially,
928 and Brook really did – not only did, was I exposed now to all these new things but I was
929 also allowed to participate and actually do things that I'd never done before. (Shindell:
930 Uhm-hmm.) And so, that was really exciting and I was very, very energized, intellectually
931 stimulated, everything. (Shindell: Uhm-hmm.) It was just great. It was one of the best
932 times of my life.

933 **SHINDELL:** Did you or Ivor put up any fight over the idea that neither of you would be
934 president of the company?

935 **BIRNDORF:** No. Because, I think we both realized that they were right. And, you know,
936 they kept, they impressed us with this point that, you know, in order for this to be very
937 successful you needed to bring in the right people (Shindell: Uhm-hmm.) as well as

938 money, and really make this into something that might be beyond what we had visualized
939 (Shindell: Uhm-hmm.) or thought of. So, but it takes time to find a president and it turned
940 out that I was actually acting, or Brook was the acting president and chairman of the
941 company (Shindell: Uhm-hmm.) and I was the vice president, but I was the one who was
942 here onsite. (Shindell: Uhm-hmm.) He was in San Francisco. So, I was actually running
943 the place for the first six months. Ivor was here too, but he was at the university still. So.

944 **SHINDELL:** So, how did you set things up initially, after you closed?

945 **BIRNDORF:** Well, it was the same, yeah, so that – (Shindell: Yeah.) so, we ended up
946 closing. The famous story about me having this \$300,000 check, (Shindell: Uhm-hmm.)
947 that I flew back to San Diego and was driving home in that green Chevy Vega and ran out
948 of gas, and was freaking out because I had this check [Laugh] in my briefcase. And, I
949 remember my last day at work was like a Friday, (Shindell: Uhm-hmm.) and on Monday I
950 started, we went and found a lab to rent at the, it was, it's now the Burnham Institute but it
951 was the, back then it was the Torrey Pines – what was it called? The Torrey Pines – uhm.
952 No, the La Jolla, La Jolla Cancer. (Shindell: Uhm-hmm.) And so I, it was the same thing.
953 I had this big, this lab with a hood and nothing in it, some benches, with an attached little
954 office with a desk and a chair and a phone, (Shindell: Uhm-hmm.) and that was it. And, I
955 did the same thing. I went and brought in Fisher, (Shindell: Uhm-hmm.) ordered all the
956 equipment, got everything, you know.

957 **SHINDELL:** Were you treated any differently by Fischer now that you were starting a lab
958 and not just, you know, in a university lab?

959 **BIRNDORF:** Yeah. I mean, now I had more money. (Shindell: Uhm-hmm.) I don't

960 know if I was treated differently. I knew this guy. We were friends. (Shindell: Uhm-
961 hmm.) So, you know, it was great. I was able to use the contacts, get things up and running
962 quickly, and you know that's part of a startup is getting things done fast. (Shindell: Uhm-
963 hmm.) You've got to get going (Shindell: Uhm-hmm.) and I was able to do that very
964 quickly. We started interviewing employees and hiring, you know. I didn't, you know, I
965 interviewed some. We brought in -- Ivor would interview them. I'd interview them. Brook
966 might come down for the right person. We hired a guy named Gary David, who was quite
967 instrumental in the intellectual property development in the future. (Shindell: Uhm-hmm.)
968 At the same time, they were looking for a president and they ended up finding this guy
969 named Ted Greene, (Shindell: Uhm-hmm.) who was contemplating starting up a
970 competitive company and they talked him into not doing that and coming and joining
971 Hybritech, and he, we started in October and he came in May or June of the following year.
972 And, you know, that was sort of tough for me. I was sort of the main honcho (Shindell:
973 Uhm-hmm.) and then now there's this guy over me. Quite frankly, Ted Greene and I never
974 saw eye to eye over the years. It was a somewhat adversarial relationship.

975 **SHINDELL:** Oh? But, did he give you enough sort of free reign to do the things you
976 needed to do?

977 **BIRNDORF:** No. Not as much as Brook had. (Shindell: Uhm-hmm.) And, I wasn't on
978 the Board of Directors. Ivor was. So, but I ended up, you know, at first I was in charge of
979 everything. Then Ted came on. Then we started hiring people. We hired a guy, head of
980 Research. I had been running the Research (Shindell: Uhm-hmm.) because I knew how to
981 do hybridomas. And then we hired people that knew how to do that and I was overseeing
982 them. Ivor was too. And then, we hired Tom Adams, so that was taken out of my purview,

983 and I was running Facilities and Operations, and we hired a guy to do that. So, that was
984 taken. [Laugh] And, Marketing, I remember the first labels I did for our first product,
985 which was a research monoclonal for hepatitis, I spelled "hepatitis" wrong. [Laughter]
986 And, we had these labels printed with "hepatitis surface antigen" but "hepatitis" was spelled
987 wrong. Anyway, as we brought on more and more people my, my area kept shrinking,
988 (Shindell: Uhm-hmm.) you know, what I was in charge of and it ended up, finally, after
989 probably at least a year or maybe longer I ended up in what was Corporate Development.
990 And, I actually seemed to, I enjoyed that and did pretty well at that. That was going out
991 and finding new monoclonals that we could license in, going to universities finding stuff,
992 technology or products that we could license, (Shindell: Uhm-hmm.) doing deals with the
993 Japanese or other companies and that kind of thing. So, I was involved in that kind of stuff
994 and that was, you know, '79, '80, '81, '82, '83. So, I was there about five years. (Shindell:
995 Uhm-hmm.) And then, in '84 is when we, Tom Adams, the head of Research and I found
996 this new technology and we went and left Hybritech (Shindell: Uhm-hmm.) and started
997 Gen-Probe. (Shindell: Uhm-hmm.) So that, that was – but Hybritech turned out to be
998 something that's never happened – Hybritech is really an amazing story and there's been
999 now books written about it. And, we were just honored a few weeks ago here (Shindell:
1000 Uhm-hmm.) locally. There was nothing like Hybritech ever, that I've ever seen. It turned
1001 out to be a magical place.

1002 **SHINDELL:** What was unique about it? What made it unique?

1003 **BIRNDORF:** The people. (Shindell: Uhm-hmm.) It seems like many of the people that
1004 came there were natural entrepreneurs. And, a number of the people that were there went
1005 off and started more companies. (Shindell: Uhm-hmm.) Hybritech was just a breeding

1006 ground for entrepreneurialism, and it turned out to be amazing.

1007 **SHINDELL:** Do you think that was because

1008 **BIRNDORF:** The climate of the company was (Shindell: Uhm-hmm.) just a magical
1009 climate. For example, on Fridays we had these TGs, you know, Thank God It's Friday.
1010 (Shindell: Uhm-hmm.) In the afternoon we'd quit at three o'clock or something and they'd
1011 have beer and, you know, hors d'oeuvres, and everybody would get together and it, it, you
1012 know, some of these at some companies, you know, some people, a few people show up for
1013 those things. They'd rather go home at three o'clock. (Shindell: Uhm-hmm.) At
1014 Hybritech, every employee came to this. It was just, it was the sort of the highlight of the
1015 week where everybody got together and was talking about business and talking about what
1016 they were doing. It was, it was just a very unique company culture. And, you know, Ted
1017 Greene, as much as he and I disagreed on certain things we also, he also somehow
1018 encouraged this and it really became a big deal. And, over the five years I was there
1019 Hybritech was truly one of the most unique experiences of my life and I think many others
1020 would say (Shindell: Uhm-hmm.) the same thing, in terms of just everybody had a
1021 common goal of success. (Shindell: Uhm-hmm.) Everybody in the whole company, from
1022 the lowliest dishwasher to the CEO was hard-charging, trying to get this thing going, and
1023 pushing everyday to get stuff done, and it just was a great, great experience.

1024 **SHINDELL:** And, have you had anything close to that experience in the companies that
1025 you've gone on to found?

1026 **BIRNDORF:** None of them have ever hit that level of energy (Shindell: Uhm-hmm.)
1027 since then. Some have come close, but none of them were ever like that.

1028 **SHINDELL:** Do you think that's because when, when you were at Hybritech you and the
1029 others there sort of had a feeling that you were doing something new?

1030 **BIRNDORF:** Yeah. I think (Shindell: Was it . . .) part of it was we were blazing the new
1031 biotech industry (Shindell: Uhm-hmm.) in a way. And, you know, while we were
1032 branched out [Moves away from microphone] we were in therapeutics, we were in a little
1033 bit research, clinical diagnostics for sure, and then we got into the therapeutic side, [Back at
1034 microphone] but we were blazing the trail. (Shindell: Uhm-hmm.) We were a new
1035 company. We were doing new things. We were, you know, during that five years I was
1036 there, there was a huge growth in biotech throughout the country. So, there were a number
1037 of competitors that were set up to Hybritech. Senacor, Monoclonal Antibodies Inc, a
1038 number of others. (Shindell: Uhm-hmm.) Some of them we fought with. Some of them
1039 we didn't. But, it was an amazing time in America for that. (Shindell: Uhm-hmm.) That
1040 was really the birth of biotech in this country. Hybritech was one of the first, (Shindell:
1041 Uhm-hmm.) you know, within the first at least ten.

1042 **SHINDELL:** Uhm-hmm. And what about locally here in San Diego? Did you perceive
1043 the sort of local landscape changing?

1044 **BIRNDORF:** Absolutely. What happened was, as Hybritech grew and we had different
1045 needs, like space, like supplies, like architecture, like legal, like intellectual property,
1046 (Shindell: Uhm-hmm.) and it grew bigger and bigger, and we needed more and more, and
1047 the network of those kinds of people started to get interested – you know, when we, when
1048 we wanted more space to build a lab, even back then, it was, you know, maybe seventy,
1049 eighty dollars a square foot. (Shindell: Uhm-hmm.) Compared to office space, which was

1050 probably ten dollars a square foot. (Shindell: Hmm.) So, there were very few landlords
1051 that were interested in providing the tenant improvements for lab space. They'd never done
1052 it before. They had no idea if they could re-lease it if we left. (Shindell: Uhm-hmm.) It
1053 was hugely expensive compared to what they were used to, and they just weren't interested
1054 in providing that. And so, it was up to us to figure out how to get that stuff done, and we
1055 either had to convince a landlord that it was in his best interests or we had to do it
1056 ourselves. (Shindell: Uhm-hmm.) So, I mean all of, there were a lot of problems
1057 associated back then with, with convincing people that this was real and that this was going
1058 to stay. Especially when we, you know, we weren't profitable. We were a startup.
1059 (Shindell: Uhm-hmm.) And, we had to, we were venture-backed. In those days, there
1060 were, you know, venture capital was relatively new. So, it posed all kinds of hurdles that
1061 today don't exist. (Shindell: Uhm-hmm.) And so, you know, solving those problems was
1062 also gratifying, and developing that network in San Diego. We developed, you know,
1063 things like Biocom. Back then it was called something else, (Shindell: Uhm-hmm.) and
1064 you know things started springing up, trade associations, and you know, this is all over the
1065 years. But, the CONNECT Program. (Shindell: Right.) That was, you know, turned out
1066 to be a, this guy Bill Otterson was an amazing guy. He just, there was nothing like that
1067 around the country and he, he was, it was because of him as an individual that that thing
1068 was so successful.

1069 **SHINDELL:** Tell me about him.

1070 **BIRNDORF:** He just had this uncanny ability to look at industry and university and see
1071 collaborations, (Shindell: Uhm-hmm.) and see how things could fit, and encourage those
1072 things. He was just, with no selfishness on his part, you know. Just, with just the total

1073 commitment to trying to make those things work and to see how valuable those kinds of
1074 things could be over time. (Shindell: Hmm.) He had this foresight and insight into that
1075 process that nobody I've ever seen had. And so, he was incredible. (Shindell: Uhm-hmm.)
1076 Former venture-backed company guy. I mean, he knew, he knew all the players. He knew
1077 the venture guys. He knew the entrepreneur side. He, so he was uniquely qualified.

1078 **SHINDELL:** Uhm-hmm. So, he was able to put people together?

1079 **BIRNDORF:** Absolutely. His forte was networking. (Shindell: Uhm-hmm.) I mean, he
1080 got people to network and to see opportunities that they probably would have never thought
1081 of. That was an amazing quality of his.

1082 **SHINDELL:** In your own case, what, what would you say were, you know, the main
1083 things that he did for you?

1084 **BIRNDORF:** He was, he was just such an ally. (Shindell: Uhm-hmm.) He was always
1085 there behind the scenes encouraging collaborations, cooperations, licensing, all kinds of
1086 things. (Shindell: Uhm-hmm.) He was just such an advocate. (Shindell: Uhm-hmm.) He
1087 was just a truly amazing individual.

1088 **SHINDELL:** And, who else would you say were the primary movers at that time, like in
1089 the '70s and '80s?

1090 **BIRNDORF:** Well, I'll tell you one thing that, that was interesting. When I, when we
1091 started Gen-Probe in '84 I found this old lab that was a commercial lab that had gone out of
1092 business on the far, what way is that, eastern side of San Diego, (Shindell: Uhm-hmm.)
1093 over by Highway 15. (Shindell: Uhm-hmm.) And we, it was like 8,000 feet and we rented

1094 that initially as our startup space. But, it was far away and most people wanted to be over
1095 here by the university, (Shindell: Uhm-hmm.) by Scripps, by Salk. But, because there was
1096 very little lab space you didn't have, we didn't have much choice. So, I had bought a house
1097 and the house I bought the woman . . .

1098 **SHINDELL:** This is a new house?

1099 **BIRNDORF:** Yeah, I bought a new – after . . .

1100 **SHINDELL:** After Leucadia?

1101 **BIRNDORF:** After Leucadia. I lived there for six years. And, when I started Gen-Probe I
1102 went out and I found this house, (Shindell: Uhm-hmm.) and the people were getting
1103 divorced and I bought it, and the woman's father was a guy named Malin Burnham, who
1104 owned (Shindell: Uhm-hmm.) Burnham Realty & Insurance, and they're one of the
1105 founding fathers of San Diego, one of the founding families (Shindell: Uhm-hmm.) of San
1106 Diego. They'd been involved in San Diego politics, and the movers and shakers for, you
1107 know, years, and years, and years. And, it occurred to me that it might make sense to get a
1108 guy like that involved in biotech. (Shindell: Uhm-hmm.) And, I called him up. I called,
1109 through his daughter I called him up one day and I went and had lunch with him and
1110 pitched him to be on our board, the Board of Directors at Gen-Probe. (Shindell: Uhm-
1111 hmm.) And, to my surprise and delight he accepted. And, now getting him now involved
1112 in biotech turned out to be a huge thing for San Diego, (Shindell: Uhm-hmm.) because the
1113 Burnham Institute – when we needed to find a bigger building for Gen-Probe, after we
1114 started to outgrow our space, he put together a consortium that built us a building with a
1115 lease back in Campus Point, (Shindell: Uhm-hmm.) which I don't think had ever been done

1116 in San Diego before. He was, he was the guy who had the original idea for Biocom.
1117 (Shindell: Uhm-hmm.) He was, he has become, he had, he became an incredible mover
1118 and shaker in San Diego and advocate of biotech. And, he's in his eighties today and he's
1119 still very involved. (Shindell: Uhm-hmm.) So, you know, I assume that would have
1120 happened without my intervention, but I actually can make the claim that I'm one who
1121 [Laugh] did get him initially involved in this, in this field. But, what were you asking?
1122 What was the main?

1123 **SHINDELL:** I was asking you who, other than Bill Otterson, were the main . . .

1124 **BIRNDORF:** Okay, so there's Malin Burnham. A lot of the people that were at Hybritech
1125 became very involved in other things. Like David Hale was involved, you know, became
1126 involved in many, many community things, (Shindell: Uhm-hmm.) charities, and other
1127 industry groups. Ivor was involved. There were, there were a number of people back there
1128 that just became more and more involved in all aspects of biotech in San Diego. The
1129 government, you know, well I think that they, they applaud biotech and today they, they list
1130 it as one of their big areas and everything else. I, you know, and while they were . . .

1131 **SHINDELL:** The local government here? Yeah.

1132 **BIRNDORF:** Yeah. I'm talking about the local government. They never went out of
1133 their way, in my opinion. (Shindell: Uhm-hmm.) For example, there were many cities,
1134 and today if you want to set up a new biotech company there's many states that are, states
1135 and cities that are actively recruiting. (Shindell: Uhm-hmm.) They want, and they'll give
1136 you big incentive programs to come there. They'll give you tax incentives. They'll give
1137 you land. They'll give you buildings, (Shindell: Uhm-hmm.) you know. Look at what

1138 Florida just did for, (Shindell: Right.) taking the Research Institutes down there. But, back
1139 then California and San Diego I don't think they recognized (Shindell: Uhm-hmm.)
1140 initially the importance of biotech. They do now, of course. (Shindell: Uhm-hmm.) But
1141 back then, biotech grew here mainly because of the scientific institutions that are here or in
1142 San Francisco. You notice L.A. is not a hotbed of (Shindell: Uhm-hmm.) biotech. They
1143 don't have near the, other than, you know, they have a number of universities there, but they
1144 don't have the level of research going on (Shindell: Uhm-hmm.) that San Francisco and
1145 San Diego have.

1146 **SHINDELL:** Let me ask you something related to that.

1147 **BIRNDORF:** And the venture capital.

1148 **SHINDELL:** Uhm-hmm. Some people have suggested that the sort of clustering
1149 phenomenon of biotech and other high tech industries is one of the things that makes sort of
1150 local sectors effective, that the clustering phenomenon actually leads to better research with
1151 people, seeing each other more often, being able to draw on employees from other
1152 companies when starting new companies, etcetera. Now when you were starting out there
1153 obviously wasn't a cluster, and so . . .

1154 **BIRNDORF:** Well, there was in a (Shindell: Oh.) sense. When I, when we were hiring
1155 the initial people for Hybritech, where did they come from? They came from Scripps,
1156 (Shindell: Uhm-hmm.) UCSD, and Salk.

1157 **SHINDELL:** So that was . . .

1158 **BIRNDORF:** So, because there was a large pool of highly technical people it made it

1159 much easier for me to start, to hire the (Shindell: Uhm-hmm.) initial group, for example,
1160 the first ten employees at Hybritech. If I was in Des Moines, Iowa, or – I'm not picking on
1161 Des Moines – but if I was in another place, (Shindell: Uhm-hmm.) where they didn't have
1162 that level of sophistication, it would have been much harder, (Shindell: Uhm-hmm.) if not
1163 impossible. So, there wasn't a cluster, but there was a cluster. There was a cluster of
1164 research institutions.

1165 **SHINDELL:** I see.

1166 **BIRNDORF:** And, I think that's what led to the cluster here more than anything.
1167 (Shindell: Uhm-hmm.) I mean, at, at Hybritech we brought in the technology from
1168 elsewhere. At Gen-Probe it was a local inventor. At Ligand it was the Salk Institute.
1169 (Shindell: Uhm-hmm.) At Neurocrine it was the Salk Institute. At Gensia it was UCSD.
1170 At, you know, at (Shindell: Uhm-hmm.) Hybritech was UCSD because we were at UCSD
1171 and started, (Shindell: Right.) and we brought over our technology from there. So, if you
1172 look back at it pretty much many – now, there's been companies that have just come here
1173 and said, "We want to, you know, either relocate to San Diego or we want to go start our
1174 company in San Diego." (Shindell: Uhm-hmm.) But many, you know, the fact that you
1175 have UCSD, Salk, and Scripps all within a mile of each other is a major advantage, and
1176 those things (Shindell: Uhm-hmm.) have grown so much since, you know, what they were
1177 back in, in the '70s when (Shindell: Yeah.) I started this.

1178 **SHINDELL:** Do you have an recollection, or did you get any impression at the time, of
1179 how your university colleagues felt about your (Birndorf: Oh yeah.) entrepreneurial
1180 activity?

1181 **BIRNDORF:** Yeah. They were not happy. (Shindell: Uhm-hmm.) As I mentioned
1182 before, the physicists and chemists, this had been going on for a number of years where
1183 they were working with industry in one way or another. Either they went to industry or
1184 they collaborated with industry, consulted with industry, (Shindell: Uhm-hmm.) sold their
1185 patents to industry. That was all well and done, but the biologists hadn't really done that
1186 ever before, and it didn't really matter for me as a, as a lowly research associate to leave the
1187 university to do this, (Shindell: Right.) but Ivor got a lot of static for (Shindell: Uhm-
1188 hmm.) being involved with Hybritech. He, a lot of his peers resented the fact that he was
1189 involved in commercial activities. They saw it as a conflict. They resented that he might
1190 make money and (Shindell: Uhm-hmm.) and did make money. They resented the fact that
1191 he might, you know, I think we might have funded things where there was another source
1192 of funding that they didn't have access to. (Shindell: Uhm-hmm.) I think it affected his
1193 career. It may have delayed promotions for him. He ultimately was promoted, but at some
1194 point he actually left the university. (Shindell: Uhm-hmm.) It wasn't during Hybritech's
1195 phase, (Shindell: Right.) but in the '90s he left to start his own cancer center.

1196 **SHINDELL:** Do you think these things have changed in the university?

1197 **BIRNDORF:** Yeah.

1198 **SHINDELL:** Yeah?

1199 **BIRNDORF:** Yeah. I think that over time the biologists now are where the physics,
1200 (Shindell: Uhm-hmm.) or the physicists and the chemists were back then, or even beyond
1201 that, you know. Now, it's rare where you find a scientist, well you know maybe young
1202 scientists are naïve and don't know what's going on yet, but the older guys who've been

1203 around, they're all attuned to commercial implications. They may not want to do it. They
1204 may not do it, but they at least know about it. (Shindell: Uhm-hmm.) They at least have
1205 heard about it. You know, they understand the concepts. Back then, you know, at
1206 Hybritech when I was dealing with patent offices, technology transfer offices in other
1207 universities, nobody had a clue (Shindell: Uhm-hmm.) what was going on. I actually
1208 would go around to the Society of University of Patent Administrators meetings that were
1209 held once a year and I made friends with these guys and took them out to dinner, and
1210 cultivated them so that when at their particular institution if something would come up that
1211 they would think of me and (Shindell: Uhm-hmm.) call me, (Shindell: Uhm-hmm.) and
1212 say, "This might be of interest to you." Or, when I was working with them it'd be a much
1213 better process because they knew me. And, that worked great for me.

1214 **SHINDELL:** So, you had to do a lot of social networking in order to, to (Birndorf: Back
1215 then, yeah.) make the system work?

1216 **BIRNDORF:** And, I burned out on it, [Laugh] quite frankly. It has been a problem.
1217 Because, as I've gotten older it's been harder and harder to do that.

1218 **SHINDELL:** Why is that? Do you just have less tolerance for the (Birndorf: Less
1219 tolerance.) sort of schmoozing?

1220 **BIRNDORF:** Yeah.

1221 **SHINDELL:** Yeah.

1222 **BIRNDORF:** Yeah. I mean, how many rubber chicken dinners can you go to over
1223 [Laugh] your lifetime? I used to go to all that stuff and over time I've just backed away

1224 from it because it just became too difficult. (Shindell: Uhm-hmm.) It just, I mean I just
1225 made, I mean I'm sure there's other people that it got better, (Shindell: Uhm-hmm.) it was
1226 easier. For me it got harder. [Laugh]

1227 **SHINDELL:** The early work that you did and the first few companies that you were
1228 involved with, some would say that they sort of formed the backbone of the cluster that
1229 exists today. Do you think that it's become easier to start a biotech company these days?

1230 **BIRNDORF:** In certain ways, yes. Certainly, it's easier from a networking point of view.
1231 (Shindell: Hmm.) The network exists today. You don't have to go make it. (Shindell:
1232 Right.) So, if you want to start a company you can find where to talk to a venture capitalist
1233 very easily. You can – now, I'm not saying you can get in, but you can at least know where
1234 to try. (Shindell: Uhm-hmm.) I mean, back then we didn't, you know, we didn't know
1235 what to do. We went, we, by serendipity we got into see Brook. In future companies, and
1236 Brook ended up investing in every one of the companies subsequently, so that was a great
1237 resource for me and Ivor. (Shindell: Uhm-hmm.) He did IDEC with us. He did Gen-
1238 Probe. He did Nanogen. He did Neurocrine. He did Gensia. (Shindell: Uhm-hmm.) He,
1239 you know, he did all of them, Ligand. But, I think it's, it's easier in that sense. You know,
1240 one of the problems though is back then there were no public companies. (Shindell: Uhm-
1241 hmm.) There were no cyclical funding periods, (Shindell: Hmm. Uhm-hmm.) like there
1242 have subsequently been because there weren't any funding periods back then. So, as
1243 companies got bigger and as they became public, and as you started getting more
1244 companies, now new entrepreneurs are faced with things that we weren't faced with.
1245 (Shindell: Uhm-hmm.) For example, if it's a bad time in the industry and people aren't
1246 investing, their deal may not get funded. (Shindell: Uhm-hmm.) Whereas, back then our

1247 deal would, would or would not get funded probably based on this technical merit more
1248 than the funding (Shindell: Uhm-hmm.). And, that's not to say that a deal that has great
1249 technology won't get funded, but it may get harder to get it funded than it would have been
1250 back then because you happen to go out looking at a bad time. (Shindell: Uhm-hmm.)
1251 The stock market's crashing. Investors are investing in other things. The Internet boom
1252 just busted, or, you know, that (Shindell: Uhm-hmm. Uhm-hmm.) that kind of thing.

1253 **SHINDELL:** Now, the model that you set with Hybritech is sort of one in which you do a
1254 lot of the initial work and the development, and then a larger company, it was Eli Lilly, is
1255 that right, came and . . .

1256 **BIRNDORF:** And, yeah, and bought it.

1257 **SHINDELL:** And bought it?

1258 **BIRNDORF:** Yeah.

1259 **SHINDELL:** And that sort of seems to be the model that a lot of biotech startups are sort
1260 of aiming for here in San Diego. Do you think that that's a good model or is that just the
1261 way things sort of happened for Hybritech?

1262 **BIRNDORF:** Well, I think that sort of just happened for Hybritech. I don't, I mean
1263 Hybritech was making products and was getting to be profitable on its own (Shindell:
1264 Uhm-hmm.) and probably could have done what Gen-Probe did. Gen-Probe is a good
1265 example where we sold the company and then it spun out again and now it's its own
1266 company (Shindell: Uhm-hmm.) and doing really well. It's like, you know, one of the
1267 biggest biotech companies in the country, certainly in its field. I, you know, it's all tied, I

1268 think, to venture capital's expectation of exit strategy. What kind of exit strategies do you
1269 have? (Shindell: Uhm-hmm.) You can either build a company up to grow it and become a
1270 big company on its own, but that's assuming that you got the management, money, and
1271 products (Shindell: Uhm-hmm. Uhm-hmm.) to get there. And, in therapeutics that takes a
1272 huge amount of money. (Shindell: Hmm.) You can, you, and in that case I don't, the
1273 venture capitalists would have to be bought out by somebody at some point. They have to
1274 get liquid. (Shindell: Uhm-hmm.) So, how do they get liquid? There's that strategy.
1275 There's the strategy of going public. And, they get liquid by having a public currency to
1276 trade, (Shindell: Uhm-hmm.) and to distribute to their limiteds, and the only other one is to
1277 be bought out (Shindell: Uhm-hmm.) by somebody. (Shindell: Uhm-hmm.) So, there's
1278 only, there's a limited number of ways for the venture guys to get a return on their
1279 investment. I think that if you start a company today you can decide before you get going
1280 what your exit strategy is, and try and develop the company towards that. (Shindell: Uhm-
1281 hmm.) So, if you want to take venture money from this front and you say "Our exit
1282 strategy is to go public," you're now dependent on these cycles of the public markets and
1283 whether (Shindell: Uhm-hmm. Uhm-hmm.) or not that public market is open or not.
1284 Right? (Shindell: Uhm-hmm.) Which, it's pretty much not open right now. (Shindell:
1285 Uhm-hmm.) Or, if you start a company saying, "I'm not planning to go public, but I'm
1286 going to build this up and then sell it," that's another strategy (Shindell: Uhm-hmm.) you
1287 can take. But then, you're also, have to be able to sell it. (Shindell: Uhm-hmm.) And, you
1288 know, it's not that easy to build up a company and sell it for big bucks. (Shindell: Right.)
1289 I mean, these are all very difficult things to do and risky.

1290 **SHINDELL:** Uhm-hmm. At the same time it seems like the big pharmaceutical

1291 companies, rather than investing (Birndorf: Absolutely.) in their own (Birndorf: I mean . .
1292 .) development are looking for startup companies?

1293 **BIRNDORF:** And it's become more and more. At first, you know, biotech was a threat to
1294 them.

1295 **SHINDELL:** How did, how did they treat you in the beginning?

1296 **BIRNDORF:** You know, they, they sort of scoffed at us (Shindell: Uhm-hmm.) the little
1297 upstart, but, you know, everything changes when you're successful. I mean, if your, if your
1298 technology works, whatever it is, and you're developing products that are selling, and
1299 people are buying them, and I mean the proof of the pie is in the eating, [Laugh] right?
1300 And so, even Hybritech, back then, Lilly wanted to get in the, they had a big strategic
1301 initiative to get into diagnostics. They were going to, they had certain diagnostics already.
1302 (Shindell: Uhm-hmm.) They wanted to grow that. Hybritech fit right into that strategy.
1303 The thing they didn't realize was that, you know, their culture killed their, killed the culture
1304 in Hybritech, (Shindell: Uhm-hmm.) and all the good people left. And, you know.

1305 **SHINDELL:** What, what would you say was their culture compared to yours?

1306 **BIRNDORF:** Well, they had a very stiff (Shindell: Uhm-hmm.) bureaucratic – I mean,
1307 you had to wear a blue or gray suit. That was the, you know, there was a very, they were
1308 not an entrepreneurial culture. (Shindell: Uhm-hmm. Uhm-hmm.) They were a
1309 bureaucratic big company culture and those two don't necessarily mix.

1310 **SHINDELL:** One thing I think you've emphasized . . .

1311 **BIRNDORF:** I mean, Hybritech died when Lilly, because Lilly bought them. (Shindell:

1312 Uhm-hmm.) So, it was very good for all the investors in Hybritech. It was not good for
1313 Lilly, or subsequent employees of Hybritech. (Shindell: Yeah.) Hybritech ended up
1314 basically going down, down, down, and then it got sold to Beckman, and then Beckman
1315 sold it to whoever. I don't remember the lineage right now but it turned out to be virtually
1316 nothing.

1317 **SHINDELL:** Hmm. How, how disappointed were you by that? I mean, did you still think
1318 of (Birndorf: I was gone.) Hybritech – no, I know. But, did you still sort of think of
1319 Hybritech as your (Birndorf: No.) baby, or anything like that?

1320 **BIRNDORF:** I did, sure. I did. But, once I left Hybritech then Gen-Probe was my baby.

1321 **SHINDELL:** Uhm-hmm. Okay.

1322 **BIRNDORF:** And even though, and I was tickled when Hybritech was sold because I
1323 made a lot of money. (Shindell: Uhm-hmm.) So, I was gone. I had my own second
1324 entity. I was on the Board of Directors. (Shindell: Uhm-hmm.) I was higher up in the
1325 organization. I had, I was a founder. I had more stock. And, you know, you don't look
1326 back, in a way.

1327 **SHINDELL:** Yeah. Well, there might be one, one way in which you look back. I mean,
1328 how did your experiences with Hybritech affect your activities, your later activities?

1329 **BIRNDORF:** Oh, they, they affected it greatly. I mean, you know, things I did at
1330 Hybritech I then did at subsequent other companies. I mean . . .

1331 **SHINDELL:** And were there . . .

1332 **BIRNDORF:** In a sense some of the things you do when you start a company are cookie-
1333 cutter. (Shindell: Uhm-hmm.) [Moving away from microphone] What were you going to
1334 say?

1335 **SHINDELL:** Oh, just, if there were mistakes you made with Hybritech that you tried not
1336 to repeat with later companies or anything like that, you know? Specific sort of
1337 experiences that carried forward into later ventures?

1338 **BIRNDORF:** I would say that's absolutely true. [Back at microphone] I can't think of
1339 what those are this moment, but I'm sure there are things that I learned at Hybritech that I
1340 did not do at Gen-Probe because they didn't work at Hybritech. On the other hand,
1341 everything's different, (Shindell: Uhm-hmm.) you know. Gen-Probe, different technology.
1342 Some similarities, diagnostics. Hybritech was diagnostics. So, they were similar. You
1343 know, what I learned, I learned a lot of things for my personal, (Shindell: Uhm-hmm.) like
1344 I said. I wasn't going to do it unless I was on the Board of Directors this time. (Shindell:
1345 Uhm-hmm.) I wasn't going to do it unless I had equal pay and stock with the other
1346 founders. That kind of thing. So, I got my, my personal objectives were to be on par with
1347 everybody else, (Shindell: Uhm-hmm.) not to have one guy get more than the other
1348 because his name was better known [Laugh] or, or not that, but because he was a more
1349 proven entity. (Shindell: Right.) Yeah.

1350 **SHINDELL:** And, can you tell me a little bit about starting Gen-Probe?

1351 **BIRNDORF:** Yeah. [Sigh]

1352 **SHINDELL:** Or, would you like to take a break first?

1353 **BIRNDORF:** Yeah. Yeah. I would.

1354 **SHINDELL:** We've been going for about an hour.

1355 **BIRNDORF:** Yeah, I would like to take a break.

1356 **SHINDELL:** Okay.

1357 **BIRNDORF:** Oh yeah, we've been going for over – where's my glasses? [Recording
1358 paused]

1359 **SHINDELL:** Start it again. Yeah, so please tell me about how you went about founding
1360 Gen-Probe.

1361 **BIRNDORF:** So, Gen-Probe, I was at Hybritech now for about five years and, you know,
1362 I never, I was not – while I loved the company, Ted Greene and I clashed a bit. (Shindell:
1363 Uhm-hmm.) I never felt my, my contribution was recognized there after the initial stuff.
1364 And, I became very close friends with Tom Adams, who was the head of (Shindell: Uhm-
1365 hmm.) Research, sort of because of our jobs. Because, I would find things and bring them
1366 in and he would, he and I would evaluate them whether or not we wanted to pursue them.
1367 That kind of thing. (Shindell: Uhm-hmm.) And we, we found this one, this guy named
1368 Dave Cohen had this invention where he said he could use Ribosome RNA as a method for
1369 detecting bacteria. (Shindell: Uhm-hmm.) Nobody had thought that ribosome RNA could
1370 be used to do this, that it was, they thought that between species it was so highly conserved
1371 that it was virtually the same, (Shindell: Uhm-hmm.) and it turns out it wasn't and that
1372 there was enough diversity that you could now use it to identify different organisms.
1373 (Shindell: Uhm-hmm.) And, because there were so many of the ribosome RNAs in a cell,

1374 in an organism, you could find, the sensitivity was, there was enough sensitivity to find
1375 them because there were so many of them. That the current sensitivity in a, of the
1376 technology could find these things. (Shindell: Uhm-hmm.) You didn't need amplification
1377 like you need now. So, we recommended to Hybritech that we look into this. (Shindell:
1378 Uhm-hmm.) And, the response, we had a committee that met, sort of an executive
1379 committee that looked at opportunities. The result of that was, [Moves away from
1380 microphone] "Well, this is nucleic acids. It's different than what we do, (Shindell: Uhm-
1381 hmm.) it would be a whole, it would be a different area. [Back at microphone] It would be
1382 too, too much bandwidth. We don't have the bandwidth for this right now, (Shindell:
1383 Uhm-hmm.) so we're going to pass." So, Tom and I kept thinking about this and we, we
1384 decided that we should perhaps license this ourselves and start a new company. So, we
1385 went to this inventor and we talked to him about that and he was positively inclined, and so
1386 we, we went back to the Hybritech Board and we made a proposal that we could take this
1387 and go do it ourselves. (Shindell: Uhm-hmm.) You know, that we weren't stealing a
1388 corporate opportunity, that we were, you know, being totally upfront. And, they said, you
1389 know, ultimately they said okay and that they actually wanted to invest in it. So, that's
1390 what we did. It was sort of similar. We went to the lawyers, (Shindell: Uhm-hmm.)
1391 started doing the intellectual property, and the corporate deal, and the name, and went and
1392 found space. I found that lab then in, I think it was in April/May of '84 is when I left, and it
1393 was sort of the same thing. It was me, (Shindell: Uhm-hmm.) Tom left too. Tom was
1394 going to be the CEO. I was going to be the vice president of, the senior VP or executive
1395 VP, (Shindell: Uhm-hmm.) and Dave Cohen was the inventor. And, the Board was going
1396 to be Tom, and I, and investors. So, we did that and it was very similar. I found that space.

1397 Unfortunately, it was way on the other side of San Diego. (Shindell: Uhm-hmm.) It was
1398 far away from everything. We went and we got the space, and I brought in Fisher, [Laugh]
1399 and I did the whole thing, got all the equipment, and we started hiring people, and we got
1400 everybody hired, and, you know, we started going. And we, we immediately ran, we got,
1401 Kleiner Perkins put in some money and Hybritech put in some money, and we started going
1402 and we ran into this huge technical problem right away, (Shindell: Hmm.). We were going
1403 after, we were trying to find what products we should do (Shindell: Hmm.) and we started
1404 looking at mycoplasma in pneumonia and tissue culture. It was a common contaminant and
1405 there was no good way to do it, and we used that as a proof of principle and that worked.
1406 And, that was pretty good, but then when we tried to go to the first commercial product,
1407 which was Legionnaire's Disease, (Shindell: Uhm-hmm.) which had just come out. Now,
1408 there was a lot of hoopla about it, but you had to get it from sputa. (Shindell: Uhm-hmm.)
1409 That was the sample, and it turns out that when you took sputa and you tried to extract
1410 RNA from it there was, there was a chemical called [aranase][01:09:50] in the sputa that
1411 chewed up the RNA (Shindell: Uhm-hmm.) before you could find it.

1412 **SHINDELL:** An enzyme?

1413 **BIRNDORF:** And it was a big technical problem, and I remember sort of the second year
1414 of Gen-Probe was when we had this huge problem and we were running out of money,
1415 (Shindell: Hmm.) we were working on solving this problem, and every week it's going on
1416 longer, and longer, and longer, and finally we did solve the problem, but it was almost the
1417 end of the company because of that technical problem. That was also when I got Malin
1418 Burnham to join the Board. You know, we were the first, really the first nucleic acid
1419 diagnostics company, (Shindell: Uhm-hmm.) the first molecular company. Really, we

1420 paved the way for molecular diagnostics, even though it was a slightly different format than
1421 is used today. It was using this ribosomal RNA. (Shindell: Uhm-hmm.) But, those
1422 patents that we filed back then held up for as long as they, people tried to challenge that for
1423 years. There was companies that wanted that and tried to get it from us, (Shindell: Uhm-
1424 hmm.) and – anyway, that was an experience in the sense that we kept raising money and
1425 finally we went public in '87. (Shindell: Uhm-hmm.) Was it '87 or '88? When was the big
1426 crash? Was it October '88?

1427 **SHINDELL:** Eighty-eight sounds right.

1428 **BIRNDORF:** Yeah. I think it was '88. We went public three weeks before the big crash.
1429 (Shindell: Hmm.) We went public at a, at a \$7 a share price and three weeks later the
1430 market crashed and our stock went down to \$3 and it stayed there. And, one of the
1431 problems was that Tom Adams was a great scientist and one of the best product
1432 development guys I ever knew, but when it came to being a CEO (Shindell: Uhm-hmm.)
1433 he wasn't exactly perfect, (Shindell: Hmm.) and as the company grew he sort of outgrew it
1434 and the Board wanted to bring in a CEO. They brought in – so, he compromised and
1435 brought in this one guy as a COO first, and Tom really wouldn't let them do their jobs.
1436 (Shindell: Uhm-hmm.) And, this inventor and I, Dave Cohen, didn't get along. And then,
1437 so in 1988 I got in this big fight with Dave Cohen and I quit. And, I just left. At the end of
1438 '88 I left the company. (Shindell: Uhm-hmm.) I stayed on the Board, though. In 1989,
1439 after the crash, we couldn't get our stock back up and we, I had just done a big deal with the
1440 Japanese before I left, a \$15 million, five-year deal with a company called Chugai.
1441 (Shindell: Uhm-hmm.) And, the company was struggling. We needed money desperately.
1442 We needed to raise at least \$10 million, and that was a minimum amount. And because the

1443 stock was low and the market was terrible, to raise money we would have had to raise it as
1444 a significant discount to market. And because of Adams' problems at the Board level we
1445 decided it would be easier to sell than fight. (Shindell: Uhm-hmm.) And, we got an offer
1446 from, we had already received an offer to buy the company from Eli Lilly but they wouldn't
1447 come up to our price. Then, Roche came in and gave us an offer. We had been talking
1448 with Boehringer-Manheim and I went to Chugai and said, "Look, all these people are trying
1449 to buy us. You guys have this big deal with us. You should buy us." (Shindell: Uhm-
1450 hmm.) And, they did and they came in and offered us more money than the other guys had
1451 by far, a significant premium. We had \$3 stock and I think they offered \$6. (Shindell:
1452 Uhm-hmm.) So, in 1989 we ended up selling Gen-Probe to Chugai for about \$110 million
1453 in cash. (Shindell: Uhm-hmm.) And, I had left working in the company and, at the end of
1454 '88, and so by the end of '89 the company was sold. When I left the company Brook came
1455 to me and asked me if I would consider running another company as an interim job,
1456 (Shindell: Uhm-hmm.) and that was called Progenics. (Shindell: Uhm-hmm.) And, it
1457 turns out that Brook and two other venture capitalists had licensed some technology out of
1458 Scripps for finding oncogene proteins in urine and it used an electrophoretic technology to
1459 do that, and the scientist's name was Henry Neiman. And, they called the company
1460 Progenics and it's head office is at General Atomics. So, I went in there and I looked at it
1461 and I said, "Okay." So, I had a job right away and I went over there. And, within the first
1462 six months I realized that the technology didn't work. (Shindell: Uhm-hmm.) It was just
1463 too complicated. It was, you couldn't, it was not reproducible, and it was just not going to
1464 work as a diagnostic for these oncogene proteins. And, I went out and I started looking
1465 around for a new technology to see if there was something else that I could find that was

1466 either, would augment that technology or that would be something else we could do.
1467 (Shindell: Uhm-hmm.) And I ended up having a discussion with a guy named Ron Evans
1468 over at the Salk Institute, who was a very smart guy and he was involved in looking at
1469 something called intracellular receptors (Shindell: Uhm-hmm.) for the steroid hormones.
1470 Things like estrogen, progesterone, glucocorticoids. And, he had isolated a number of
1471 these receptors for these steroids, (Shindell: Uhm-hmm.) which are powerful drugs. And, I
1472 did, I thought that this was very good technology and I went and I did a deal with the Salk
1473 Institute to license the whole package exclusively to Progenics. (Shindell: Uhm-hmm.)
1474 And, we decided to license, the board agreed. We decided to get rid of all the employees
1475 that were involved with the other stuff, Neiman, (Shindell: Uhm-hmm.) and the rest of
1476 them, change the name of the company, and do basically a restart around this new
1477 technology called . . .

1478 **SHINDELL:** And just give up on the oncogene stuff?

1479 **BIRNDORF:** Give up on the oncogene stuff. And so, the new company was called
1480 Ligand, (Shindell: Uhm-hmm.) and it was based on these intracellular receptors. And,
1481 that was great fun because I wasn't involved with the Progenics licensing, you know. I had
1482 never looked at that before I came, (Shindell: Uhm-hmm.) and when I saw it I never liked
1483 it and I didn't think it was going to work, and it didn't, and it never has. (Shindell: Uhm-
1484 hmm.) Even to this day.

1485 **SHINDELL:** The people who had been involved in that, that you let go, did they go on to
1486 do that same research somewhere else or . . .

1487 **BIRNDORF:** Yeah. And Neiman got a job at a university back east somewhere, in

1488 Pittsburgh I think, and continued to work on this, but I don't think it ever, other than as
1489 research, (Shindell: Uhm-hmm.) it never resulted in commercial activity. So, we started
1490 Ligand. That was in, I started it in '88, so in '89, and (Shindell: Uhm-hmm.) it turns out
1491 that when we started Hybritech remember I told you that Lyon & Lyon, this guy was our
1492 patent attorney, (Shindell: Uhm-hmm.) he actually went and became general counsel at
1493 Genentech. (Shindell: Uhm-hmm.) And, they gave us a new attorney named Larry
1494 Respass. So, Larry was working with us in the law firm at Hybritech and at some point I
1495 recruited him to join Hybritech full-time as our general counsel. And, he came onboard
1496 and he was very involved in defending Hybritech's IP that they developed, and he
1497 successfully won this big case and all that stuff. And then, when Hybritech was sold I
1498 recruited him to Gen-Probe. (Shindell: Uhm-hmm.) So, he was now general counsel at
1499 Gen-Probe. And then when I left Gen-Probe in 1989, '88, (Shindell: Uhm-hmm.) he then
1500 left in '89 and came over to the new Ligand, (Shindell: Uhm-hmm.) and he was there for
1501 many years. I stayed at Ligand then through 1991 and we, we left out, what we left out was
1502 while I started Gen-Probe in '84, in '85 Ivor and I got together and started talking about,
1503 with this other guy named Bob Sobel, about how to use monoclonal antibodies in a
1504 therapeutic way (Shindell: Uhm-hmm.) to treat lymphoma. And, we started IDEC [Laugh]
1505 in 1985. And, I was on, I was on the Board of Directors of IDEC but I was not, because I
1506 was working at Gen-Probe I didn't join IDEC. (Shindell: Uhm-hmm.) So, IDEC was
1507 going on and then in '86 or, I think it was '86, there was another group that formed that was
1508 looking at this technology out of UC for cardiac stuff, congestive heart failure and stuff,
1509 which formed the basis -- we actually had the first board meeting in my kitchen at home --
1510 [Laugh] for Gensia. (Shindell: Uhm-hmm.) And, I was on the Board of that. So, I was

1511 involved in all these things at one level or another. But, at Ligand, so after I changed the
1512 company we started going on, developing the assays for these receptors and molecules. I
1513 stayed until '91, (Shindell: Uhm-hmm.) and then I brought in a president. And, this new
1514 guy didn't want me around. (Shindell: Uhm-hmm.) He didn't want a founder around,
1515 (Shindell: Uhm-hmm.) and, you know, because people have had problems in the past. So,
1516 I stayed on the Board there but I left the company in '91 and I took off a year of '92. I
1517 basically took that year off and, and part of '93, and then when I came back is when I got
1518 involved with Nanogen. (Shindell: Hmm.) And, I've been involved with Nanogen since
1519 '93. (Shindell: Uhm-hmm.) So, that's now . . .

1520 **SHINDELL:** That brings us pretty up to date, yeah.

1521 **BIRNDORF:** Yeah. I mean, Neurocrine was something that happened in '92, (Shindell:
1522 Uhm-hmm.) and there's been a number of other smaller startups that I've been around for
1523 the last four or five years, (Shindell: Uhm-hmm.) other than that. But that, yeah, that
1524 pretty much brings you up to date.

1525 **SHINDELL:** That year and a half break, that's one of the only breaks, it seems, like you've
1526 ever taken? Yeah. [Laugh]

1527 **BIRNDORF:** That is the only break I ever took. I, I left in February of – no, December.
1528 I think I left Ligand in February of '92 and I came back in April, I spent the winter skiing,
1529 of '92-93 in Telluride. (Shindell: Uhm-hmm.) And, when I came back in April of '93 from
1530 Telluride is when I started getting active in Nanogen. So, yeah. So, from, for about a year
1531 and, a little over a year, a year and a few months I took off. That was my only break.
1532 Yeah.

1533 **SHINDELL:** Yeah. You must have felt like you deserved a break at that point, I would
1534 think?

1535 **BIRNDORF:** I did.

1536 **SHINDELL:** Yeah.

1537 **BIRNDORF:** I was really burnt out. And, I feel like I deserve a break now. [Laughter]
1538 But, I got to get this thing up and running. (Shindell: Uhm-hmm. Uhm-hmm.) You
1539 know, I got to get this thing cleared up before I go.

1540 **SHINDELL:** Yeah.

1541 **BIRNDORF:** Yeah.

1542 **SHINDELL:** Well, I have basically one last set of questions that are sort of meant to, I
1543 guess, (Birndorf: Okay.) close the interview. Unless there's . . .

1544 **BIRNDORF:** Where do the questions come from? They're yours, or the group puts them
1545 together, or what?

1546 **SHINDELL:** I wrote up basically a sort of a sample stock set up questions, (Birndorf: Uh
1547 huh.) and then I've tried to sort of ask as few of them as possible. Because, the truth is, you
1548 know, you've touched on a lot of the stuff that was the (Birndorf: Core of it?) stuff that we
1549 were going to (Birndorf: Yeah.) ask about anyway. (Birndorf: Right.) But yeah, I drew
1550 them up based on a reading of articles that have been written about biotech (Birndorf:
1551 Uhm-hmm.) and sort of what are the big questions people are interested in in biotech,
1552 (Birndorf: Okay.) and stuff like that.

1553 **BIRNDORF:** So, what's your questions?

1554 **SHINDELL:** The closing questions (Birndorf: Yeah.) are, let's see. Some of these we can
1555 skip because I think you've already asked them, (Birndorf: Okay.) or answered them.
1556 [Moves away from microphone] (Birndorf: Yeah.) So, we'll just go straight to, I guess
1557 they're sort of the general, generalized questions (Birndorf: Okay.) [Back at microphone]
1558 about your experiences and how you would sort of sum them up? How you would evaluate
1559 your career, in other words. So, what do you think is the most important change that's
1560 happened in San Diego biotech, what some people call "Biotech Beach," during your time
1561 here?

1562 **BIRNDORF:** Well, I mean, you know in a sense it's the awareness, the network, the fact
1563 that this is an established thing. You know, back when I started there was nothing,
1564 (Shindell: Uhm-hmm.) and now there's everything. And, you know, there's companies, I
1565 don't know, I forget the number, but it's something like a hundred companies a year are
1566 starting in San Diego in biotech. So, it's obviously established here now. (Shindell: Uhm-
1567 hmm.) All of the things that we worried about are not worries anymore, venture capital, the
1568 network, how do you get access to supplies, buildings, labs, all those things are pretty much
1569 taken for granted. (Shindell: Uhm-hmm.) You know, I think it's the sophistication that's
1570 developed over the years has changed the fundamental prospect of how you start a
1571 company, (Shindell: Uhm-hmm.) as it would have in any case in any successful industry
1572 (Shindell: Uhm-hmm.) as it developed. Just like the chemists and the physicists (Shindell:
1573 Uhm-hmm.) had done in the first part of the Twentieth Century, developing polymers, or
1574 for DuPont, and all those companies that sprung up around new technologies, and new
1575 chemistries, new physics. (Shindell: Uhm-hmm.) The same thing happened with

1576 biologists, it just took longer. (Shindell: Uhm-hmm.) Obviously the, the subject has
1577 become, well one of the issues is the information is now, comes faster and there, you can't
1578 keep up with it. (Shindell: Uhm-hmm.) And so, no matter what the development of the
1579 Internet has changed things.

1580 **SHINDELL:** Uhm-hmm. Definitely. Yeah.

1581 **BIRNDORF:** But, the amount of information, the amount, number of meetings, the
1582 interplay between scientists and, you know, now you can work much easier with somebody
1583 in, in Russia, (Shindell: Uhm-hmm.) or with the Internet changed a lot of, you don't
1584 necessarily have to work with a guy down the street here. It's easier to work with people a
1585 longer way because of the way information has disseminated today so easily. I think that's
1586 changed things a lot. (Shindell: Uhm-hmm.) I don't know that that's the most important
1587 thing. I think access to capital, (Shindell: Uhm-hmm.) the ease at which people can raise
1588 money around a good idea has changed dramatically since I started. You know, each year
1589 you see the amount of funding that comes into San Diego, venture-backed funding is huge.
1590 (Shindell: Uhm-hmm.) So, venture capitalists have raised bigger and bigger funds. They
1591 need to invest more and more money in a particular deal to get enough ownership in it,
1592 (Shindell: Uhm-hmm.) to get a return that's meaningful. So, people are able to raise larger
1593 amounts sooner than they could have before. Those kinds of things have changed
1594 (Shindell: Uhm-hmm.) and helped entrepreneurs be able to start companies faster with
1595 enough money to last them longer, or to do things faster than they (Shindell: Uhm-hmm.)
1596 could have (Shindell: Uhm-hmm.) in the past. The thing about pharma, recognizing that
1597 they can't do everything and now being much more open to collaborate and/or buy smaller
1598 companies (Shindell: Uhm-hmm.) has dramatically changed over the years. It's probably

1599 at its peak right now. (Shindell: Uhm-hmm.) It will probably only get better. It costs
1600 more and more to develop a drug and the regulation is getting harder and harder. (Shindell:
1601 Hmm. Uhm-hmm.) So, those are all things that play into this.

1602 **SHINDELL:** Okay. If you have any idea of this one. Did these changes that you've just
1603 described occur because of local changes in San Diego or larger changes in science? I
1604 think you've sort of touched on that. But, maybe you could get a little bit closer, or maybe
1605 focus in a little bit more, because I think you've talked about sort of the bigger changes.
1606 But, what about sort of local changes in San Diego? Do you think that the . . .

1607 **BIRNDORF:** Well, the local changes are what I said, (Shindell: Yeah.) it connects back
1608 going, it's sort of declined, now it's starting up again. (Shindell: Uhm-hmm.) You've got
1609 these industry groups that are very active here now. You've still got the fundamental
1610 Scripps, Salk, and UCSD combo, (Shindell: Uhm-hmm.) that has, is the basis of
1611 everything and now you've got all these institutes that have sprung up. The Burnham has
1612 become big, (Shindell: Right.) and there's Torrey Pines Institute, and all these other
1613 institutes, the Sidney Kimmel Cancer Center, or this and that, (Shindell: Uhm-hmm.) so
1614 you've got much more of an infrastructure here in the city. Now, in terms of state
1615 government I'm not sure that that's changed all that much [Laugh] over the last thirty years,
1616 you know. The state, the city government has been screwed up for many years and it
1617 continues to be screwed up, (Shindell: Uhm-hmm.) and they, I don't think they've really
1618 ever, other than recognizing that bio, that biotech is a great source of tax income for the
1619 city, (Shindell: Uhm-hmm.) that it's a clean industry, white-collar industry, it's one that
1620 they're fortunate to have here. (Shindell: Uhm-hmm. Uhm-hmm.) I just saw a note
1621 yesterday saying that the, you know, in real estate the one bright light in this [Laugh]

1622 terrible real estate market has been the bioscience side of things where labs are still,
1623 (Shindell: Uh huh.) you know, in demand and at a premium, and that (Shindell: Uhm-
1624 hmm.) landlords are still doing well with laboratories. So, I think, you know, from that
1625 point of view I don't think that the city government has ever really bent over backwards to
1626 help the biotech industry.

1627 **SHINDELL:** So, you think . . .

1628 **BIRNDORF:** Certain mayors have been more or less, you know, inclined to be favorable
1629 toward biotech, but, you know, for example source of clean and, clean and abundant water
1630 is imperative to certain biotech operations. The whole thing of the radioactive waste in the
1631 state of California has always been a problem for years. (Shindell: Uhm-hmm.) So, you
1632 know, while everybody likes the positive aspects of tax revenue, and jobs, a lot of the
1633 issues that have plagued us have never gone away. And, as I said before you see other
1634 states are actively pursuing biotech. They're trying to get, they're trying to get companies to
1635 move (Shindell: Uhm-hmm.) to their state or startup in their state, offering big incentive
1636 programs, tax, and real estate, and that kind of thing. California has never really done that.
1637 (Shindell: Uhm-hmm.) They didn't have to because they had it all here. And again, it all
1638 boils down to, in my opinion, the real thing that made San Diego a cluster was the Scripps,
1639 Salk, UCSD right there (Shindell: Uhm-hmm. Uhm-hmm.) with trained people and
1640 technology development that was like, that people could get and license, and, like I got the
1641 stuff from the Salk Institute to start Ligand, for example. (Shindell: Uhm-hmm.) That
1642 cluster that stayed here and grown has really made this one of the premier spots in the
1643 country.

1644 **SHINDELL:** So – this isn't actually one of the questions I had prepared, but do you think
1645 that, for example, the new venture in Florida will be successful without having the, sort of .
1646 . .

1647 **BIRNDORF:** If they can get those institutes. (Shindell: Uh huh.) You know, one
1648 mistake, I think, is that they – well, they put them all over the state, you know. They might
1649 have tried to put them all in one (Shindell: Uhm-hmm.) spot. I don't know if that would
1650 have worked or not. I don't know the dynamics of that. But, if they get those institutes
1651 grounded down there and if they get them to be huge sources of government funding that
1652 comes into the state, (Shindell: Uhm-hmm.) that creates a big talent pool of jobs and
1653 creates technology, I think they could be. I think it was very smart of them to do that.
1654 (Shindell: Uhm-hmm.) And, they went and they took already existing institutes and didn't
1655 change what's here, just expanded. It's a win-win. It's a win for the institutes that they get
1656 more funding, (Shindell: Uhm-hmm.) and it's going to, time will tell if they win, you
1657 know, if it works or not, (Shindell: Yeah.) but it's a good bet.

1658 **SHINDELL:** Okay.

1659 **BIRNDORF:** I think.

1660 **SHINDELL:** Let's see, I think you've already covered this. What made bio, Biotech
1661 Beach successful? And, do you think that there's anything sort of that continues to threaten
1662 the success of biotech in San Diego, or has it overcome all of the hurdles against it?

1663 **BIRNDORF:** Well, I don't know, you know. It's hard for me to – the biggest thing that I,
1664 as a CEO, have worried about over the years in all the companies I've been involved with is
1665 always money. (Shindell: Uhm-hmm.) I mean, money is, is the constant bane of a startup

1666 and of a growing company. You always need access to capital and whether that's venture
1667 capital, or public capital, or corporate capital, or government capital I suppose, of the four
1668 sources, (Shindell: Uhm-hmm.) regardless of where you get the money that's the bottom
1669 line. And, to the extent the economy slows down, money will slow down. And, I think that
1670 that's the only risk, is the continued funding of (Shindell: Uhm-hmm.) biotech over the
1671 years. I don't, you know, science is going to continue on and science is the final arbitrator
1672 of these commercial activities (Shindell: Uhm-hmm.) in biotech. And, science will always
1673 win, you know. So, I think there's always going to be new science. (Shindell: Uhm-hmm.)
1674 There's always going to be new technologies that come out of that science that are
1675 commercializable. And so, biotech's going to continue on and it's going to get, you know,
1676 there's going to be discoveries in the next decade that are going to continue to awe
1677 everybody. (Shindell: Uhm-hmm.) The genome is the latest. You've got nanotech, and
1678 you've got all these things coming up that (Shindell: Uhm-hmm.) can really define new
1679 things. So, I think it, yeah, I think it's established. I think the issue is going to be, "How do
1680 you fund all this stuff?" (Shindell: Uhm-hmm.) The government funding is drying up.
1681 Venture capital is spotty. You know, some years it's great. Some years it's not so great.
1682 (Shindell: Uhm-hmm.) When the, the public markets are dried up too. So, you know, it's,
1683 the sources of funding are changing, (Shindell: Uhm-hmm.) are ever-changing. So.

1684 **SHINDELL:** Part of your answer to the last question leads me to the next one, which is,
1685 based on your experiences in biotech and having come from university settings into the
1686 biotech sector, what, how would you characterize the relationship between the biosciences
1687 and biotechnology? Is it a direct sort of transfer of information from science to technology,
1688 or is it more of a back and forth between technology and science?

1689 **BIRNDORF:** I, I think that a successful one has to be a back and forth. (Shindell: Uhm-
1690 hmm.) It's very difficult to go to an inventor and just take what they have and take it out of
1691 their setting and do it by yourself, without their help. So, it's very important to have a
1692 inventor be involved with your – in other words, there's a back and forth and it continues
1693 on. (Shindell: Uhm-hmm.) There's improvements made in the lab that need to be
1694 translated to the commercial operation, and back and forth, and back and forth. Sometimes
1695 it's the opposite. Sometimes the commercial (Shindell: Uhm-hmm.) guys discover
1696 something that the scientist wants. (Shindell: Uhm-hmm.) You know, so I think it's a
1697 much better proposition if the, if it's a back and forth, rather than just a one-way street.

1698 **SHINDELL:** Yeah. That would seem . . .

1699 **BIRNDORF:** Now, that doesn't mean that it can't be a one-way street. If something is
1700 very simple and it's just an invention that's a product, and it just needs to be
1701 commercialized, like a device for a stint or something like that, maybe that's, doesn't
1702 require that much. (Shindell: Uhm-hmm.) But, in the real biosciences arena, where you're
1703 talking about intracellular receptors, or (Shindell: Hmm.) ribosomal RNA, things like that,
1704 you do need the interactions.

1705 **SHINDELL:** Uhm-hmm. So, it sounds like you wouldn't draw a very firm line between,
1706 or make a firm distinction between science and technology. They're sort of wrapped up
1707 together, in your view?

1708 **BIRNDORF:** I think they're wrapped up together. Yeah. I mean, clearly there, the line is
1709 between technology development and commercial development, I suppose.

1710 **SHINDELL:** Ah. Okay.

1711 **BIRNDORF:** There's a big difference between developing a technology and developing a
1712 product.

1713 **SHINDELL:** Uhm-hmm. That's interesting. [Jet plane in background] Let's see. I think
1714 we've covered that. How did your experience here in San Diego and in biotech affect your
1715 life? Sort of a general sort of reflective question, I guess.

1716 **BIRNDORF:** Before I answer that, the other thing I wanted to say though is, (Shindell:
1717 Oh sure.) I think the other thing that's affecting companies in general though, (Shindell:
1718 Uhm-hmm.) is the whole space in the United States of this whole Sarbanes-Oxley
1719 accounting. It is really becoming much more difficult to develop a public company
1720 (Shindell: Uhm-hmm.) and to be competitive in the United States versus other countries.
1721 (Shindell: Uhm-hmm.) And I want, and in terms of expense it's even more difficult to be
1722 in California (Shindell: Uhm-hmm.) versus other states, for example. It probably costs you
1723 ten percent more to do things in California than it does in Iowa, (Shindell: Uhm-hmm.) or
1724 somewhere else. (Shindell: Uhm-hmm.) So, you've got all of those other things that are
1725 going on. The thing that I'm seeing over the years is it almost seems like our Congress and
1726 our Senate, our Congress, or the House and the Senate are almost trying to do their best to
1727 make American business noncompetitive on a global (Shindell: Hmm.) basis because of all
1728 of these rules and regulations. The overregulation of, of science. You look at the stem cell
1729 issue, for example, the overregulation based on religious beliefs. (Shindell: Uhm-hmm.)
1730 You got Sarbanes-Oxley, the regulation of companies, all the new accounting rules. I
1731 mean, not only do they cost a lot but they're, they're really dampening our ability to be
1732 competitive on a world-wide basis. (Shindell: Uhm-hmm.) Countries, companies in other
1733 countries that don't have all this crap, if they're done right and if they had the ability to raise

1734 money, could kill us because of the, they can get to the market faster and they can develop
1735 products that – just for example in what we do here, molecular diagnostics (Shindell: Uhm-
1736 hmm.) have become so regulated in the U.S. that it's, and they're so differently and less
1737 regulated in Europe, it's so much easier to do it in Europe than it is the U.S. [Jet plane in
1738 background] It's ridiculous. And, it's becoming almost to the point where people don't
1739 want to even compete in the U.S. market. (Shindell: Uhm-hmm.) So, what was the other
1740 [Laugh] – how does it change my life?

1741 **SHINDELL:** Yeah.

1742 **BIRNDORF:** Well, obviously it's changed my life. It's changed my life from a financial
1743 point of view dramatically. I mean, I don't know if, what I would have ended up doing with
1744 myself had I not done this, (Shindell: Uhm-hmm.) and I don't know if I would have been
1745 successful financially or not. But certainly, it's made a major impact on my life in terms of
1746 what I've ended up doing. And, the answer's yes. [Laugh]

1747 **SHINDELL:** Yeah. Because you never really dreamed that, or maybe not dreamed, but
1748 expected this would be where you would, would end up when you were in say your mid
1749 twenties, or . . .

1750 **BIRNDORF:** No, I never thought that I would be involved in – you know, at one point I
1751 wanted to be a scientist, (Shindell: Uhm-hmm.) and I thought I might be a scientist
1752 working – I guess I envisioned working in like a school or something like that, (Shindell:
1753 Uh huh.) or maybe in a company. I'm not sure. I don't think I ever got that far in my
1754 thinking. (Shindell: Uhm-hmm.) You know, I also thought that I might go, end up going
1755 to medical school eventually. (Shindell: Uhm-hmm.) I'm sort of glad I didn't. When I

1756 look at the people that went to medical school that were my, you know, my schoolmates
1757 that ended up going, none of them are particularly happy today. I mean, with capitation
1758 and all the, you know, they deal with sick people, (Shindell: Uhm-hmm.) so a lot of them,
1759 you know, some of them still enjoy it. Some of them don't. A lot of them have gotten out
1760 of medicine because they (Shindell: Yeah.) didn't like it. I just like the fact that the other,
1761 you know, I haven't talked about the altruistic point of view of this but the fact is that we've
1762 developed a huge number of products over the years that have helped people a lot, [Jet
1763 plane in background] (Shindell: Uhm-hmm.) saved a lot of lives, Rituxan, and Zevalin at
1764 IDEC, huge benefit to people with lymphoma and other diseases. The PSA antigen for
1765 prostate cancer I'm sure, millions of men have been early detected prostate cancer and
1766 saved their lives. What other products? You know, Chlamydia GC test at Gen-Probe,
1767 getting STDs diagnosed early, preventing the spread, (Shindell: Uhm-hmm.) and the
1768 medical problems to the person that has them. So that, we have really changed the world
1769 from a medical point of view with many of the products and so that's very gratifying.
1770 (Shindell: Uhm-hmm.) I mean, you know, you don't think about that everyday, but you
1771 know, there are times when I really do think about how those products, you know, one
1772 legacy when I move on to the great majority [Laugh] I, at least I can say that some of the
1773 things I did do had a major impact on (Shindell: Uhm-hmm.) healthcare in the world. So
1774 that, that's good.

1775 **SHINDELL:** Uhm-hmm. Yeah. That sort of leads into, or actually, you know, makes me
1776 wonder, you know, you described in the first interview that we did of your younger days
1777 your sort of hippy days, what do you think that, if you encountered yourself today at that
1778 age, [Laugh] what would your hippy self think of you today?

1779 **BIRNDORF:** Think I sold out. [Laughter]

1780 **SHINDELL:** But, you don't feel that way?

1781 **BIRNDORF:** Well, you know, sometimes. You know, back then it was peace, love. I
1782 think I did change, you know. I became – I think when people make money they tend to
1783 become conservative, somewhat, (Shindell: Uhm-hmm.) politically, or many do. I think I
1784 did for a while. I think I go back and forth. I agree with what I believe in and (Shindell:
1785 Uhm-hmm.) it's not necessarily what any one party believes in. I believe in what I like to
1786 believe in. But, I do think that I'm very different than those days. In a way I miss those
1787 days. (Shindell: Uhm-hmm.) Those were very carefree, [Laugh] and stressless years, but I
1788 suppose that's with everybody when they're in their late teens and early twenties,
1789 everybody's searching for what they want to do. And, I mean you know, I'm always, to me
1790 all my life one of the key things that have driven me is to not be bored. (Shindell: Uhm-
1791 hmm.) And, when I feel bored it really, it makes me depressed. I can't really, I'm not at my
1792 best if I'm bored, and I'm bored a lot. And, for me it's real important to be, regardless of
1793 what it is to be interested in what you're doing. If you have that, to me you have
1794 everything. (Shindell: Uhm-hmm.) To me, having that, that gives you the sense of
1795 urgency. The drive is to be passionate about something, whatever it is. (Shindell: Uhm-
1796 hmm.) It can be art. It can be science. It can be business. It can -- whatever it is. As long
1797 as it's something that you're passionate about. To me, what's the most, what I've been most
1798 passionate about has been startups. (Shindell: Uhm-hmm.) So, for example, I'm not that
1799 passionate about Nanogen as a fifteen-year-old not-startup company. (Shindell: Uhm-
1800 hmm.) I'm much more passionate about things that I believe in and that are a startup phase
1801 that I can work on and grow something from an idea to a reality. That's much more fun for

1802 me and much more exciting for me than having a company that's all rules and regulations,
1803 and you can't do this, and you can't do that. (Shindell: Uhm-hmm.) I like those early days
1804 of a startup where people are just creative and the juices are flowing. Those are the best
1805 days, for me.

1806 **SHINDELL:** Okay. Would you say then that you are attracted to risk, or to . . .

1807 **BIRNDORF:** You know, risk really, you don't consider (Shindell: Oh.), you don't
1808 consider losing when you're in those days.

1809 **SHINDELL:** You just think about winning?

1810 **BIRNDORF:** You just think about winning. (Shindell: Uhm-hmm.) That's right. Losing
1811 isn't even on your mind. It's, "This is going to work because it works. It, you know, it's
1812 good." (Shindell: Uhm-hmm.) You believe in it so much that losing isn't even a option.

1813 **SHINDELL:** Okay.

1814 **BIRNDORF:** Now, that's the way it used to be. I don't know, since I'm not involved in
1815 any real startup today that's like that, I don't know how I would feel then. I think it's
1816 become harder and harder to fund things, (Shindell: Uhm-hmm.) and so to me the risk is
1817 that you start something and you can't get it funded for, for reasons having nothing to do
1818 with whether it's good or bad. (Shindell: Uhm-hmm.) That to me is, is a scary
1819 proposition. You get down a road and then you can't fund it then what do you got to do?
1820 You either got to shut it down or you got to continue doing it at a very low level that
1821 doesn't make sense, and I don't like that situation. (Shindell: Uhm-hmm.) You know,
1822 that's happened in several things I've done in the last five years. So. (Shindell: Uhm-

1823 hmm.) Ever since 2000 when the bubble burst I think it's been much harder to get some
1824 kind, some startups done.

1825 **SHINDELL:** Uhm-hmm. Let's see. So, is there anything, any question that I should have
1826 asked you that I didn't? Anything you can think of?

1827 **BIRNDORF:** No, I think you covered everything.

1828 **SHINDELL:** Okay.

1829 **BIRNDORF:** At least not that, not that I can think of right at this moment.

1830 **SHINDELL:** Okay. And, I guess the last question is, are there other scientists or
1831 individuals who you think we should interview for the project? Who would you
1832 recommend interviewing?

1833 **BIRNDORF:** Well, I would certainly, I would interview Malin Burnham. (Shindell:
1834 Uhm-hmm.) I would interview Ivor. I would interview Brook Byers. I would interview
1835 Ted Greene. I would interview David Hale. That's, that's a good group right there.

1836 **SHINDELL:** Okay. Then, if you don't have any, anything else to add?

1837 **BIRNDORF:** No. I don't now. If I think of something I'll let you know.

1838 **SHINDELL:** Yeah. Please do.

1839 **BIRNDORF:** Okay.

1840 **SHINDELL:** Well, thank you very much.

1841 **BIRNDORF:** You're welcome.

1842 **END PART 2 OF 2 [01:47:53].**

1843 **END OF INTERVIEW.**

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The San Diego Technology Archive (SDTA), an initiative of the UC San Diego Library, documents the history, formation, and evolution of the companies that formed the San Diego region's high-tech cluster, beginning in 1965. The SDTA captures the vision, strategic thinking, and recollections of key technology and business founders, entrepreneurs, academics, venture capitalists, early employees, and service providers, many of whom figured prominently in the development of San Diego's dynamic technology cluster. As these individuals articulate and comment on their contributions, innovations, and entrepreneurial trajectories, a rich living history emerges about the extraordinarily synergistic academic and commercial

collaborations that distinguish the San Diego technology community.