

UFHC 52

Interviewee: Joachim Stefan Gravenstein

Interviewer: Nina Stoyan-Rosenzweig

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R: This is Nina Stoyan-Rosenzweig and I am interviewing Joachim Stefan Gravenstein. The date is January 17, 2002, and we are in the medical history center at the University of Florida. Dr. Gravenstein, could you tell us a little bit about your early life, where you born, when, childhood experiences?

G: I was born in Berlin in 1925, [and] people usually ask me [if that] was East Berlin or West Berlin. Of course, there was no such difference [then]. Grew up in Giesseu, in Hessa, part of the time. Spent a year in the United States in 1938-1939. Came back during the war because my mother was ill in Germany. Then I survived the war with a little bit of luck and, after the war, I went to medical school. Started actually during the war and then continued after the war. Started my clinical training in Bonn in Germany, where I also went to medical school. Then went to Basel in Switzerland to do anesthesia and from there was invited to come to the United States in 1952 by the chief of anesthesia at the MGH [Massachusetts General Hospital] in Boston, Dr. Beecher. We then went to Boston. In between, I got married and had, by that time, two kids. We arrived in Boston in the fall of 1952 and I was a resident. I think it might be amusing for current people used to 2002 or 2000 to know a little bit about the circumstances of life as a resident then. Let me just finish the overall [picture], then we can go into the details. In 1956, I had been appointed a Fellow at the MGH and teaching Fellow at Harvard Medical School. I realized that I knew less than my American colleagues. With the encouragement of my chief, I went back to medical school and, from 1956-1958, I was at Harvard. I graduated in 1958 and before I graduated, I was offered the job of chief of anesthesia in Gainesville. I was still a medical student when I was chief of anesthesia here, at least on paper. Then I stayed in Gainesville and started the department here and in 1969, I had plateaued in Gainesville. I felt I wasn't able to push things along any further and I went to Case Western Reserve [University] in Cleveland, was chairman there and stayed there for ten years. Then once again, administration became a little tedious and I was offered a graduate research professorship here in Gainesville and came back in 1979 and have been here ever since. I'm now emeritus, but I'm still active. Not clinically, but teaching, research, and serving the IRB [Institutional Review Board] and things like that, so I can make myself useful. Give interviews to historians.

R: You mentioned that in 1938 you spent a year in America. How did you get to America? What were you doing there?

G: On my father's side, the family had immigrated to the United States before, I think, even before [Adolf] Hitler [Chancellor of Germany, 1933-1945; leader of

Nazi Party in Germany, 1921-1933]. The last remnants left after Hitler, because in my family, we're not Jewish, incidentally, even though the name may suggest otherwise. Hitler was considered to be a joke and not to be taken serious, not realizing how beastly serious he really had to be taken. My aunt left for America in the mid-1930s, maybe 1936. My relatives here in the States then invited me to spend a year over here, which of course was terribly exciting for me.

R: You were thirteen at the time.

G: Yes. So I came over here and I started out in Woodstock where my relatives were artists, a painter, and an author. Then I went to Cincinnati and went into a Catholic school. I'm not Catholic, either. [I] remember vividly the nuns very patiently teaching me English, which was most useful. They were very kind. Then I went back to Woodstock and went to high school in Kingston, New York, and I had to take the bus because my relatives lived out in the country somewhere. The war had broken out and I remember that I was greeted by the song, "we're going to hang our washing on the Siegfried line..." [I was] recognized as a German here. Then I went back by boat, breaking the blockade. I was almost being interned by the British, who had intercepted this American steamer bringing wire and stuff like this to Scandinavia somewhere. We spent six weeks in the Orkney Islands [off the coast of Scotland], being marooned there. They debated whether or not they should take a potential future German soldier off the boat rather than having to capture him later on or shoot him. But they didn't, they let me through.

R: Why did you go back to Germany?

G: My mother was in Berlin and she was ill, and there was nobody else to support her, so I felt that it was my duty to go back, very much against the wishes of my U.S. relatives.

R: What year was that? Was that in 1940 or 1941?

G: This was earlier, this must have been late in 1939. It was winter and I got back before Christmas.

R: What were the Orkney Islands like? I just have an interest in the Scottish Isles.

G: The boat was anchored in a bay, so there was no way of getting to visit land. We were just stuck on the boat, on the ship.

R: They wouldn't let you off?

G: They wouldn't let me off or anybody else off. We just sat there until the red tape,

which was military – it's the same everywhere – had worked its miracle.

R: Obviously you'd been in the United States for a year, and clearly your family did not ascribe to Hitler's ideas. What was your reaction to society when you went back to Germany, when Hitler really had established control?

G: My personal reaction was probably a mixture of patriotic fervor, defend the country and so forth, which was expected of all young people, and tinged with a sensation of the idea that Hitler was really a buffoon and not to be taken serious[ly]. One part of my family came from an old officer's branch going back centuries. They were very, very impatient with Hitler. It was that ambivalence that influenced [me]. I remember that my mother had a physician that was Jewish, a German physician who at one point disappeared, or was taken away or something. We had no idea what that meant. As a matter of fact, just to continue this particular perspective, I remember when the armistice had been declared. I was a soldier at the time. We had the first Allied publication, printed in German, available to us. There were reports from concentration camps and starving people and gas chambers and things like that. We thought that this was such a clumsy propaganda ploy that nobody could take this seriously. We laughed. We said, this is so ridiculous. Nobody would ever do a thing like that. To believe that we would swallow this propaganda stuff was silly. It took me several months before I realized that this was real.

R: For you, the war was more a matter of patriotism. You said you grew up in Hessa? That area did have a long military tradition.

G: The military tradition really came from the branch of my family with the military side. The other was the artistic side. It was the artistic side that was in Giesseu, in Hessa. The military side, that was Berlin.

R: When you were growing up, were you trained or encouraged in any particular field?

G: More on the artistic than on the other side.

R: Obviously the war came in and disrupted things for you. Did you have any sense before that that you were interested in medicine?

G: None whatsoever. When I came back, we were without money. My father had died many years earlier and my mother was ill and we had no income. I started working in [a] chemical factory in Berlin to support her, having not finished school. When I became a little older, my mother died when I was sixteen and I was on my own and I joined this paramilitary outfit which was called the *Arbeitsdienst*. We dug ditches, but [we were] uniformed, [with] military

discipline, and we loaded bombs on planes and did, not front-line duty, but paramilitary duty. I did this for a year and I was discharged from there and came back to Berlin and lived with my grandfather, who was from the other side of the family. His impression was that the war was lost and that this was all going the wrong direction and it was a question of surviving rather than winning. He persuaded me to apply for a medical commission in the Navy which would allow me to study medicine. I thought I wasn't smart enough to do that because my schooling had been so miserable. I did it anyway and they accepted me, based upon school record. I'm serving on the admissions committee here for medical school. My goodness. Would they ever have rejected me! [Laughter]. I mean, they wouldn't have even opened the letter if my application was that bad. But I got in. So I became a Navy cadet sort of thing. After basic training, we were sent to Strasbourg, which was German at the time, to study medicine. My first semester was incredible. They were talking about things that I had no idea what this was supposed to be. They said that sugar had carbon in it and I couldn't believe that. That was clearly not correct. Salt was made out of sodium and chloride. It was absolutely unimaginable what they were talking about. I had a lot of catching-up to do.

R: Did you have to study outside of the coursework to catch up?

G: You did the best you can. This was military, so this was all regimented and regulated. You marched to the class, you sat there and you studied in the barracks, [or] wherever you were left to study. I did the best I could.

R: What year was this?

G: That was in 1943, probably.

R: Your grandfather had already decided by then that the war was lost.

G: Yes. [His house in Berlin was bombed and I lost contact with him. He died in a cellar in 1945 when the Russians captured Berlin].

R: Had you finished that course by the time the war was over?

G: No. Strasbourg is a beautiful old city, just a wonderful old city. The people in Strasbourg considered themselves as French as a German could be. Therefore they assumed that the Allies would never attack Strasbourg because the assumption was that the Allied command would recognize the value of having somebody with French leanings. They were wrong, however. One morning there was a heavy air raid on Strasbourg. Every day the bombers came across and the air raid sirens were blaring. The Strasbourgiens would always ignore them because they were convinced that nobody would ever attack. This one

day they did attack, in the early morning. There were people shopping at the time and they didn't pay any attention to the air raid and then the bombs fell with devastation on the unprotected populace. I was there. Just a terrible, terrible carnage. One of my most haunting memories comes from that time. After the raid was over, houses were either destroyed or burning. I heard a voice coming out of a basement of a burning house. I went in there and found a woman whose house had collapsed. There was a beam across her thigh with all the broken timbers and bricks and so forth lying there. There was no way of getting her out of there and the house was burning up above. She said that she had already lost her children who had been in the rubble someplace and would I please shoot her because she faced a terrible death being burned alive and not being rescued. I didn't have anything to shoot anybody with, being a medical-type person, so I ran outside, tried to find help and also some support. To make a long story short, I couldn't find anybody to do anything and I didn't know what to do. Eventually, I left her.

R: It must have been a terrible feeling of helplessness.

G: Just awful. It's still something that is with me. Of course, this is the sort of thing that happens in war all the time.

R: The sort of memories that people carry with them throughout their lives.

G: Anyway, that was at the end of medical school, just one semester in Strasbourg. Then we were assigned to be corpsmen in field hospitals in France and eventually in Holland. I served as a corpsman part of the time on ships, transporting wounded people, and part of the time in the hospital itself.

R: Were these ships in the North Sea?

G: These were actually barges. We had big red crosses on top of them, but the Allies didn't always pay attention to that. The [Germans] had bridgeheads on the channel, so we had to go into these bridgeheads and get the wounded out at night, get them back to areas where they could be transported inland. That's what we did.

R: Were these mostly German soldiers?

G: No, as a matter of fact they were not only Germans. Having been in the United States and being able to speak English reasonably well, I remember one instance where they had captured a bunch of British soldiers and were interrogating them. Perfectly legitimate, and not in any way cruel or anything like that. Just interrogation, where do you come from, what's your unit, and so forth. There were two soldiers who didn't answer. The German officer who did

the interrogation spoke English reasonably well, but not all that well. They asked me, would I please talk to these two guys who wouldn't give any answers. I sat down and offered them a cigarette. They wouldn't talk to me. I just sat there. They were as young as I was. Eventually, one of them started talking in German. I said, man, what are you doing in a British uniform? It turned out that these two guys came from Poland, where they had been in a German enclave in Poland. [They] had been drafted into the German army as Germans after the Germans had overrun Poland. [They] had been captured by the British, had been recognized to be Poles, had been put into the British army, as Polish allies had been captured by the Germans. There these two poor bastards were caught, in something that was way beyond their capability of dealing with.

R: Trying to understand their own loyalties and things like that.

B: Completely topsy-turvy. I don't know what happened to them. I hope they stuck to their British story and didn't answer. They didn't speak English.

R: They couldn't have answered the interrogations.

B: They couldn't have answered, no.

R: Where were you when the war was over?

B: I was in a field hospital in Holland and I remember the people who took over were Canadians. I had been responsible [in this field hospital for] soldiers, regardless of nationality, who had penetrating chest wounds. They all died. They got horrible infections, which have a very awful sweet nauseating smell. They all died, we knew they would die. We didn't have anything to save them. This young Canadian medical captain made rounds for the first time after he took command of this [hospital]. We had three or four of the soldiers I was to present to him. I said, these penetrating chest wounds don't have a [good] prognosis. He said, oh, we can cure them. We all rolled our eyes and said, this young whippersnapper, he doesn't know what he's talking about. What we didn't know is that he had penicillin. By today's standards, a ridiculous dose, the penicillin was administered and overnight they turned the corner and began to eat and began to heal. Just a miracle.

R: Was it a ridiculously small dose?

G: Ridiculously small dose, at that time.

R: None of the microbes had any resistance to the penicillin.

G: They didn't know what hit them.

R: Had you not heard of penicillin? I know it was in short supply at points during the war.

G: In the scientific literature, it might have been available, but I didn't know anything about it and I don't think anybody else there anticipated that.

R: That's really an amazing story. As you say, they could be cured with a ridiculously small dose, but also the response was so immediate.

G: The response was [that] within a day or two they began to look better. The other thing is the fact that something could be done, where we knew from experience that nothing could be done. We had sulfonamides, [which were] completely useless.

R: When did you graduate from medical school?

G: I graduated in 1951. [In 1945,] we were then discharged and eventually I made it to Bonn because my commanding officer was from Bonn. The alternative would have been for me to go back to Berlin. A, I didn't have any relatives left there and B, it was known that the Russians would take young, healthy soldiers and take them off to God-knows-where to do labor. Many of them never came back. I gave Bonn as my home address, with the help of my superior, who probably saved my life in doing so. Stayed in his family and went back to medical school in Bonn.

R: What was life like after the war? You were in West Germany and basically cut off from East Germany.

G: At that point, there was still no East and West Germany. The [Berlin] Wall came much later. I think we were hungry, we were cold, we were poor. I remember that it was a very cold winter, it must have been 1946-1947. [It was] very cold and people froze because there was no coal. The coal that had been mined in Germany were transported off to France or something like this. In Bonn, the [coal trains] had to go through some switching. Sometimes these trains stopped there for a few hours and we swarmed over them and stole the coal and took [it home]. There was a story in Köln [Cologne], where the cardinal, his name was Frenz, was presented with the ethical dilemma of a man who had an infant and a sick mother in a very cold apartment. Would it be a sin for him to steal something, which he could not obtain otherwise, in order to save the lives of his family? The cardinal said under those circumstances it would be forgiven. Whereupon the populace, instead of saying we are stealing it, they said we are Frenz-ing it. They used his name to make a verb out of it.

Once communication was reestablished, my relatives from the States sent care

packages, which were wonderful. We used cigarettes and coffee to barter for coal and food and pay the rent and things like that, pay tuition. With a stick of cigarettes, you could heat for a whole winter.

R: Given the general state of devastation and shortages, what was medical education like?

G: Awful. It was poor for three reasons, really. One is that because of Hitler's idiocy, the contact with the scientific world in the West had been really severed. Germany, which used to be a leader in science in the previous century, was lagging way behind. Then the war had broken out and that had further interrupted things. Finally, many of the professors had been killed in the war. The buildings had been destroyed. It was all makeshift. Not good at all. If you compare this to teaching today, what medical students get in the United States, day and night isn't even a big enough comparison. Completely, very poor. Books were not available. If they were available, they were old. Just awful.

R: In 19th century, as you said, Germany was a leader in medical science, as well as in developing a system of university training that was eventually exported to the United States. Do you think that science suffered after World War I also, or was it just Hitler's actions that caused the decline?

G: It's an interesting question. I hadn't thought about this and I can't answer it. I haven't looked into this. Much later, when I was in Boston, I went to the library and read some of the German papers that had come out in the 1930s and early 1940s. Having by then caught up with Western science, I was speechless for the nonsense that had been published. The genetic business and the party lines. When I was young, I didn't know why people left Germany and why scientists would leave, because I didn't understand it. When I finally looked into it, I was wondering why any scientists stayed, because it was so obviously absurd, what had been peddled for science. I think that would not have been true after World War I because the politics were different.

R: There wasn't a mass exodus.

G: Right.

R: What about the economic conditions?

G: Economic conditions were of course bad [after World War I], but I don't know, I just don't know.

R: Who did you have as your instructors, considering how many people were killed or left?

G: Whoever was left, and [they were] not terribly memorable. I have one amusing episode in Strasbourg when I was in medical school there. I had a girlfriend in Berlin, innocent girlfriend. She liked to go to medical lectures. This was during the war. She went to listen to Professor Ferdinand Sauerbruch. [He] deserves recognition for his contributions to medicine, surgery, hyperbaric medicine and stuff like this. He was a big-shot in Germany and recognized for being a big professor and Hitler made him an ambassador, I think to Turkey. She listened to a lecture of Sauerbruch and she sent me a postcard with his picture on it. In Strasbourg, our superior was a young physician who [thought] it was necessary to really teach us military discipline. He would get us up at night and chase us around. We had to do exercises and so on at the same time [we had to] go study. In the evening, when we had lights out, he would come by and he would go over [the room and lockers looking for dust] and if he found anything he would punish us for this. At that point I got this picture, so when it was my duty, I put [the picture of Sauerbruch] into a frame and put it on the table. When I [reported] the room ready for inspection, [our chief medical officer] saw this picture of Sauerbruch. He knew exactly who it was because he was famous. He said, who's that? I said, this is Uncle Ferdinand, sir. He took a breath and said, okay. From then on, we had absolutely no problem with him. We had Uncle Ferdinand watching out for us. Years later, I was a visiting professor in Munich and there was [Sauerbruch's] nephew, also a Professor Sauerbruch. I went up to him and said, I'm German and I don't think you realize that we are related. He, of course, didn't know about our relationship. I told him this and he was not amused. He was too German for that. I think he eventually got over it. He visited us in Gainesville subsequently.

R: That's a wonderful story. Obviously, your fellow students were amused.

G: They were very happy with having Uncle Ferdinand look after us.

R: After medical school, you ended up as an intern in Basel. How did that happen?

G: First, I was an intern in Bonn. I don't usually record that because it [lasted] about half a year. I wanted to become a neurosurgeon and served in a hospital in Bonn as an intern. We had a surgical chief who, I don't know a polite word for saying this, was a pompous, arrogant, probably basically stupid, unkind, and any other acceptable adjectives that come to mind, chief. As an example of the atmosphere in German medical institutions at that time, this was a Catholic hospital and he was the chief of surgery. He would not speak to medical students because that was below his dignity. He spoke only to residents and his associates. I remember one day I was assisting at an operation and he did something different than [how] he had done it previously. I asked him, why do you do it this way? He looked at me and he said, why don't you first read a good book before you ask questions. I didn't say anything anymore. He would

always start cursing with goddamns and so on and so forth in this Catholic hospital, which was anathema to the nuns who served as scrub nurses. Then he would throw instruments through the operating room. He would fling them out and they would clatter around me. He cursed at the same time and the scrub nurse would start crying. Because this happened every day for upper abdomens, of which we had many, the scrub nurse set a sterile beaker with sterile sponges on her instrument table. When she started to cry, she would take a kelly clamp, grab one of those sponges, dry her tears sterilely and dispose of them. It was part of the set-up.

R: This was in Bonn?

G: This was in Bonn.

R: You were there for six months?

G: I was there for six months. That is actually what got me into anesthesia.
[Interruption]

R: Where were we?

G: We were [talking about] how I got into Basel in Switzerland. I have to tell one more story of this surgeon who was responsible for getting me started in anesthesia without [his] knowing it. I read a paper in the German medical journal about anesthesia, which was brand-new then. There were no anesthesiologists in Germany. This was not a recognized specialty. I asked him about this. I remember to this day, in his office I can still see him at the desk and he was sitting in a chair like this. I asked him about [anesthesia] and he tilted his chair back and slapped his thighs like this. He said, anesthesia is the most ridiculous thing that anybody could come up with, this was something for nurses and there was always a surgeon to take care of problems and only the British were crazy enough to waste physician manpower on that. I walked out of there and wrote an application for an anesthesia program training in Switzerland. It's not one of the noblest motives [for] going into the specialty, but that's what happened.

R: He was your inspiration?

G: Expiration, I guess. I don't know about inspiration.

R: Was anesthesia also being practiced as a specialty in Switzerland?

G: Yes. The chief [of anesthesia of the Bürgerspitae, the University of Basel teaching hospital, Dr. Hügin,] had spent a year in Boston with my future chief

Beecher at MGH. I learned the basics from [Hügin] and then Beecher came as a visiting professor. I wrote a paper on that which is in *Anesthesiology* [journal]. I don't know whether you saw this in the bibliography. The [organizers of the sesquicentennial of ether anesthesia] had invited me to give a talk on at Harvard, which was subsequently published.

R: What year was that?

G: The first anesthetic public demonstration was in 1846, so this was in 1996. [It was] published a year later.

R: What was the experience like in Switzerland?

G: Wonderful. It was peaceful, clean, undisturbed, undestroyed. They had everything to eat. It was like going to heaven. It was wonderful. We couldn't afford to live there, so we lived with one child at that time in a single room, with no running water, on the German side of the border. Basel is on the border of Germany and Switzerland and I commuted. [At first] they didn't pay me anything. We lived very frugally indeed.

R: How were you able to support yourself?

G: You know, I really don't know how we did that. Probably my wife's parents helped out a little bit. Still, we were dirt poor. As a matter of fact, we have one story in the family that has sort of become a phrase that people repeat. We had no money, and eventually the Swiss offered me a paid position and this was heaven. My goodness, suddenly there was money. By today's standards, it was a very modest income, but for somebody who hadn't had anything it was quite substantial. So my wife and I went shopping. As a woman, you will appreciate this. She saw a beautiful dress in the back of the store. She went to it and looked at it and the saleslady viewed us and she sort of looked us over. She said, I think this is out of reach for you. My wife turned to her and said, money is of no consequence. We couldn't afford the dress, we didn't buy it. But the [saying] that money is of no consequence has stayed with the family ever since.

[End of side A1]

R: They offered you a paid position and you were in Basel for a year.

G: A year-and-a-half, something like this. Then Beecher, the chairman of anesthesia at Harvard, came to be a visiting professor. I was asked to meet him and take him to his hotel since I spoke English, which I did. He was the big shot. We met at the airport because he was a consultant to the Armed Forces.

He impressed me enormously and interviewed me and asked what I was doing . [He] then invited me to continue my training in Boston in his department, which I subsequently did.

R: What was the training actually like in Basel?

G: There were two residents. It was a very personal affair. Every afternoon at 4:00 we would have coffee and sweet rolls with a chief. It was really Socratic teaching, it was wonderful. Today we drive our residents, there is now before Congress a law which limits the hours that residents may work to eighty hours a week. I mean, just imagine that. The pace was very nice. Scientifically, it was probably more modest, because there was no real research going on in the department.

R: What were they using as anesthesia at that point?

G: In 1951, it was ether, ether, [and nitrous oxide] and evipan. It was mostly ether anesthesia.

R: In the history of anesthesia, wasn't ether first used and then they switched to chloroform and then back to ether?

G: Almost. The chloroform came in a little later and was liked by some people because it provides a very smooth induction, until people found out that it had some disadvantages. There was a big commission to examine this. It fell out of favor, but it was still being used. When I interviewed here in Gainesville in 1958, the sales rep[resentative] told me that they still had to have chloroform on the exhibits for scientific meetings because it was still being used in some places.

R: What were the disadvantages?

G: It produces cardiac arrhythmia and in some people, it causes liver damage.

R: What are the disadvantages of ether?

G: It's explosive and chloroform is not and [ether] causes nausea in a [considerable] percentage [of people]. It's a safe anesthetic. It kills fewer people than chloroform.

R: They were using ether and evipan?

G: Evipan, yes.

R: Who was administering anesthesia at that point in Germany?

- G: Usually nurses, but there were no specialists. In Bonn, while I was there, there were nuns, nurses, who had acquired skills in giving anesthesia. For anesthesia history, I remember when a private patient came, the chief would say, we have to use *the* machine. There was a machine standing in the corridor covered by sheets. Then he said, you are going to give the anesthetic, to some poor resident who had never done it in his life. He then would go out and look under the sheet to see what sort of knobs there were and what to do with it. They would then start anesthesia with this machine. The few times I had observed this, the patient would turn blue because they thought that nitrous oxide really didn't need oxygen with it; it's N₂O, so there's oxygen in it. [They did] not realize that it doesn't work that way. The [patients] all turned blue. This would be observed and then the chief would say, she is allergic to nitrous oxide, so we'd have to switch to something else. We had [many] allergies to nitrous oxide in Bonn [– of course, there is no such thing as an allergy to nitrous oxide].
- R: Than anywhere else. To get back to Basel, you were trained there to administer it yourself.
- G: Correct.
- R: Obviously, the ether was inhaled. How was the evipan administered?
- G: Intravenously. Muscle relaxants were just beginning to appear at that time, so we began to do that. Endotracheal anesthesia, where you put a tube into the trachea, was just getting established. This was still very new for Europe, the anesthesia. Up until that point, it was inhalation anesthesia only, with a mask on, dropping ether on a mask, as they had done for the last hundred years.
- R: Were the innovations coming from the United States?
- G: United States and England. The British have been very good in anesthesia, but the big push came out of the United States.
- R: You went to Boston in 1952, but at what point did you decide that anesthesia was something you wanted to do?
- G: When Beecher invited me, it was exciting and I had no idea of the significance of Mass General Hospital as being sort of the Mecca. For me, it was just another hospital. Once in Boston, they let you know what they think of themselves. We had some difficulties with the visa at first. Then it turned out that the wife of the consul in Basel needed anesthesia and I happened to be giving it. They were very grateful and asked me whether they could do anything for me. I said, yes, how about a visa? So that helped.

R: Was that a visa for your family as well?

G: Yes, a visa for both of us. In the meantime, we had [our second] child in Basel. But it was a visitor visa. I didn't want to immigrate. I thought that Germany needed me more than the United States, so we came as visitors. I was on some sort of World Health Organization fellowship, so I had to report to Washington to announce my arrival and express my gratitude for the fellowship, which I did. In order to get [to America], we had taken the train to Cherbourg and then taken the *Ile-de-France* ship to New York. I had to show my tickets [to the U.S. State Department] because they were going to pay for them. The official in the State Department in Washington looked at my papers and said, why did you take the ship from France, why didn't you take it from Switzerland? I pointed out, it's very difficult to do. [Laughter].

R: It's somewhat landlocked.

G: It was not the Secretary of State, it was one of the lesser officials.

R: What was living in Boston like? What were your living conditions?

G: Living conditions were extraordinarily different. We were very self-reliant and it didn't take much to keep us going. The pay was poor. I think our income, as residents, was \$150 a month. We were getting free food, as residents, at the MGH. Once we [were] settled, I would stuff my pockets with fruit. I also started taking soft-boiled eggs because my wife could scramble them later on. Which led to a few disasters, because in those days scrubs suits were not customary and we wore white uniforms into the operating room as well as wherever we went. I had these eggs in my pocket and then there was an emergency, and I had to rush up to the operating room and forget about the eggs and lean over something. Then something soft and warm would run down my thigh. Made that unforgettable.

R: I can imagine. Did anybody else notice this?

G: I don't think so. If so, I don't recall.

R: Did you have family still in the United States at that time?

G: Yes, I did. We had family in Woodstock, [New York], where I had been, and in Cincinnati and in New York [City]. They certainly helped us to get established. But we were self-reliant. Arriving, they met us at the boat. I remember I had two shirts, two [pairs of] pants, one pair of shoes, \$200 and that was it. Some underwear. That was the extent of it.

R: How old were your children at that point?

G: Nick was born in 1951 and Alix in 1952.

R: They were infants. They basically have grown up in the United States.

G: Yes, but they all speak German. We kept that up at home.

R: What was the intellectual climate like and what kind of training were you getting as a resident there? Did Mass General live up to its reputation?

G: Since it thought of itself as setting the standards, of course it would have lived up to [its reputation]. The teaching was really fairly Socratic. It was expected that you reached out and learned what you needed to learn. Spoonfeeding was considered to be something not even to be seriously thought about. Lectures were at a minimum and the expectation was that you went to the library and looked things up yourself and asked questions if you had to. [That] brings up an interesting linguistic point. Even though I had been in the States and did speak English, I still needed to relearn stuff and needed to learn more. I remember that some [parts] of the American approach led to some confusion. Since I had given anesthesia before in Switzerland, when I did [what] I had learned in Basel, one of my instructors would say, why don't you do it this way? I know perfectly well now what that means. It means, you bloody well do it this way. Precisely, he said, why do you not do it this way? Question mark. Then I gave an answer exactly why I wouldn't do it this way. It took a little bit for me to appreciate why this didn't go down so well.

R: Was there a difference in training methods? I think, traditionally, we hear about German training in academia as being fairly hierarchical.

G: Very hierarchical.

R: Was the same true of Switzerland?

G: Yes. It was the same, maybe not quite as, well probably quite as bad. Just about the same. Austria, Switzerland, Germany. It got significantly less so in the northern countries, Scandinavia and Great Britain. It was much more civilized.

R: Being in the United States, was that an issue or something that you noticed?

G: For example, I mentioned that in Switzerland we had two residents, one Swiss guy and I were the two residents. We would not talk to each other in the you form, the colloquial, familiar form. We would be formal. I came to the States

- and immediately everybody called me Nik, slapped me on the shoulder. I was not prepared for that. It took me a little while to [get used to it and] I think probably it's never completely left me. I appreciate it now, how it was intended.
- R: How did you end up being called Nik?
- G: That's one of those family stories. Supposedly when I was being baptized, the pastor was inebriated and forgot to put Nikolaus on the birth certificate.
- R: That was supposed to be your name?
- G: I was present but I don't recall that. So I've been called Nik all my life.
- R: That's not the name that appears on your documents.
- G: It doesn't, but everybody calls me Nik, so I keep getting mail [as] Nik. When we had our first son, we called him Nikolaus and wanted to put things straight, not realizing that he eventually would get all my mail.
- R: I guess that's probably still an issue here [because Nikolaus Gravenstein is now chair of the UF anesthesia department].
- G: It is, but I know when the mail is for him and he knows when it's for me. I think once or twice, he's accepted invitations to give talks someplace where they were very surprised that he turned out to be so young.
- R: You did a residency for two years, then you became a clinical Fellow. You have an M.D. from Germany. Did you have to get licensed in Massachusetts?
- G: Yes, I had to take an examination.
- R: Was that after your residency?
- G: It was during the residency.
- R: The clinical fellowship then lasted for two years. Is there anything about that that you want to talk about?
- G: It's just a title. I was a resident and I guess, depending out of which pocket you get paid, you get called this or that.
- R: So your duties essentially were the same?
- G: A resident doing clinical work

R: As a resident, was your work all clinical?

G: Yes.

R: Were you doing any research at this point?

G: I began to do research fairly early. I did a clinical residency and completed that. I stayed on and I guess they made me an associate or something like this. It's probably on there, I forget.

R: A clinical Fellow and then a research Fellow.

G: Then a research Fellow, and then I did some research.

R: What were your research interests at that point?

G: My research interests were very much dictated by the research interests of my chief, Beecher, who was interested in the subjective response and the effect of drugs on how we respond to pain and things like that. I did studies on human volunteers and in patients with narcotics. I did one study with heroin, placebos, one with antitussives for cough in a TB [tuberculosis] sanitarium. That's the sort of studies I did.

R: After 1956, did you go back to school at Harvard?

G: Yes, that's when I admitted that I knew less than my American colleagues because they had a decent, rigorous academic training in medicine and I was not up to that. I decided that if I wanted to stay in the States and wanted to be competitive, I needed to catch up. I spent two years and joined the third- and fourth-year class of Harvard medical school and got my M.D.

R: Were you still doing any clinical work at the time?

G: No, that would have been impossible. They had arranged for me to come in on weekends every now and then and continue some of the research and write papers and things like that. They paid me a little bit for that and made life a little easier.

R: It sounds as if, when you started, there were relatively few choices of things that were used, at least in Europe. Were they developing new types of anesthesia?

G: The real flourishing of new techniques and new drugs happened later in the 1960s and 1970s and 1980s and 1990s, [when] a bunch of new agents came out and new techniques. At that time, I think the greatest change was the increasing availability of muscle relaxants [and the] increasing use of muscle

relaxants.

R: Would those be given before the general anesthetic?

G: No, this is with general anesthetics. You anesthetize a patient, then you paralyze them and ventilate their lungs mechanically. This complete paralysis makes it easy for the surgeon. It also makes it pretty dangerous if you don't ventilate.

R: You really need anesthesiologists who are trained and aware of everything that needs to be done for their patients. Was there anything else about your years at Harvard that you wanted to discuss or share? Other than Beecher, were there any people who stand out as being particularly influential or interesting?

G: I had a good friend there, Thorkild Andersen, who, when I accepted the job down here, joined me as the first faculty member. He came half a year after I got here. He was my senior actually, in Boston, by a year or so. I spent three months in pharmacology there which allowed me to have interesting discussions with Dr. [Tom] Maren [professor, University of Florida department of pharmacology and therapeutics]. When I interviewed here, Tom Maren and I talked about his stuff and pharmacology and all these exciting things going on. Then he invited me to have dinner with him in his house. We climbed into his car and we drove off and continued our discussion. Suddenly, he stopped the car and I looked around because I thought we would be in front of his house. He turned to me and said, I'm lost. He had been so absorbed by our discussion that he hadn't paid any attention to the way that he [was going], [which] must have been [how he had been] driving for the last two years to his own house.

R: He had been here for two years already, then.

G: Yes.

R: You had a clinical associate in anesthesiology at Harvard. You were the associate anesthetist in 1958. That was obviously before you came to Florida. Is that when you were done with your course work?

G: I think all of these titles are meaningless. This is just administrative gobbledy-gook.

R: To keep you on the staff while you were completing your training. You were recruited by Dr. [George] Harrell [dean, University of Florida College of Medicine, 1954-1964] in 1958.

G: It was actually Ed Woodward [professor of surgery, University of Florida] who

recruited me. He was chairman of surgery, as you probably know. He needed an anesthesiologist and he talked to different people and Harvard was a place that you would check. Beecher then arranged for Woodward to come up to Boston and I was invited to meet Woodward and we talked. I was still a medical student at that point. Woodward invited me to come have a look, which I did. I was most impressed. It was Florida, I had never been in Florida before. It was green and it was spring and it was wonderful. It was all new, a new place. The idea of being able to be on the ground floor of a new institution, having the ability to decide all the things that you needed to make it run and get it started was just very exciting. Woodward had been a wonderful supporter of anesthesia. When I came down here, my colleagues in Boston said, Nik, there's one thing you have to be sure of, be sure to get departmental status for anesthesia. I knew this was important for the specialty. When I came and I sat down with Dr. Harrell, who was doing his fingernails with a razorblade, I said, Dr. Harrell, there's just one thing, I need to have departmental status for anesthesia. He looked at me and said, Dr. Gravenstein, exactly how big is your department? I said, well, it's just me. He said, do you think we can postpone this just a little bit? I had to admit that it was reasonable to postpone it a little bit, which we did.

R: You came down as chief of anesthesiology.

G: Right, within the department of surgery. I was an assistant professor of surgery and chief of anesthesia at that time.

R: At what point did you get other people in anesthesia and become a department?

G: We slowly grew. Thorkild Andersen joined me in January of 1959. Then half a year later we had our first resident, which was Dr. Perkins, both of them stayed on in faculty and became well-known and liked by everybody, admired. There's now an effort to establish a chair in their name. The T. W. Andersen Perkins chair, you may have heard of it. We had some nurse anesthetists and the surgeons in order to help out, would also rotate surgical residents through anesthesia, which I think was good for them and it certainly helped us. It just slowly grew. We added on faculty and residents. I forget exactly when it became a department. I applied for departmental status in 1966 [or] 1965.

R: You did become chairman of a department of anesthesiology in 1967, so maybe that is when it was actually created. When did you decide that you wanted to remain in the United States?

G: In 1954, we went back to Germany to see how things were going and whether there was a future for me there. I was horrified with the hierarchical conceit of the system and the feeling that you really didn't have academic freedom the way I had become used to it in the United States. It was just very, very different. I

decided that it would be nice to stay in the States, at the MGH they wanted me, so they supported my request for a change in visa. In order to make this happen, I had to spend three months in Europe, at which time we were in Copenhagen and I worked there.

R: You said that in Scandinavia, they're a little bit less hierarchical.

G: A little less, it's much more relaxed than Germany.

R: Did you ever think about staying in Europe, but not in Germany?

G: No, that was not really an option at that time. It is now, with the European Union, but it wasn't at that time. You had all sorts of visa hurdles and so on.

R: You came to Florida in 1958 and the first class of medical students had started in 1956, but the hospital didn't actually open until 1958. Was the hospital open when you arrived?

G: [It was] not really finished, quite. It was, of course, late. Always the estimates are wrong. They were supposed to open in August and I think we opened a couple of months later or something like this. In the meantime, I had ordered all the anesthesia equipment and the drugs and prepared everything. There are uncounted things to be thought of, which was great fun to do because suddenly you had a budget and you said, we want this and this and this and it had to be right and they couldn't argue with you. It was a nice time. And then we waited for the first patient. The relationship with the city had been difficult, to say the least. The local colleagues were very much concerned of having a big, fat university teaching hospital take all the business away from them. George Harrell went to society meetings and I went too. We were all encouraged to go. He promised that we would not take anybody except by referral or from out of state. There was no danger of ever undermining Alachua General Hospital and their positions and they bought it.

R: Did it take long for someone to send you a referral?

G: It did take long and the first patient that we had, the first surgical patient, was really not all that voluntary. He was somebody from Sunland Training Center, which now has a different name [now called Tacachale]. There is an institution out on Waldo Road for the mentally retarded. It's a state institution and it used to be called Sunland Training Center. They had patients there and many of them were severely retarded people. This patient had a fistula in his abdomen and he kept it open artificially by poking pencils and safety-pins and fingers and so on [in it]. They had repeatedly tried to close it and hadn't succeeded. That was our first patient. I gave anesthesia and Dr. Woodward closed it. He then put the poor guy into a cast so that he couldn't get at the wound, even if he tried,

until it was healed. A successful operation.

R: Would the patient pick out stitches also?

G: He would just go to work on it. He had a fistula going into the gut.

R: It's amazing he didn't end up with peritonitis or something like that.

G: I think there were adhesions to prevent this. It was like a jejunostomy, I guess.

R: So it was a success. He was immobilized until it healed.

G: And closed with wires. Woodward was not taking any chances. Slowly, there were other specialists coming in. Then we practiced to do the first heart operation. This was also an exciting time. We had [practiced bypass procedures in dogs]. I knew quite a bit about this because of my work with pharmacology in Boston, where we had done a lot of [heart-lung preparations]. Then it was a question of finding a suitable patient to be referred. The patient the surgeon picked was an eight-year-old girl who had an atrial septal defect, which is a relatively benign affair and she was otherwise quite healthy. Our expectations were that she would do quite well. It was a big day to do this first heart operation. I gave anesthesia and the surgeon, Dr. [Myron] Wheat [chief of staff, Shands Teaching Hospital, 1968-1972], did the operation. While this was going on, out of my peripheral vision I knew that something was not right. I finally saw that the ceiling was cracking right on top of the table with the open chest of this little girl. I later on found out that we needed hot and cold water in the room in order to run the bypass pump. [The pipes were brought in through the crawlspace over the O.R.]. Somebody had stepped between the rafters there and had cracked it. The humidity and the vibrations shook this loose. We had to get the ladder into the operating room and the O.R. supervisor, with wet blankets, stood there behind the surgeon keeping the ceiling up until the operation was done. Then she came down and she had plaster in the blanket. The patient did fine.

R: What year was this?

G: That was probably 1959 or 1960, something like this.

R: What was it like to be part of this new institution?

G: Let me just tell you one other thing. I have eight children, I don't know if you knew this or not. The first child to be born at Shands was one of my children. Dr. [Harry] Prystowsky was [professor and] chairman of OB/GYN [1959-1973] and he said, we are not ready to do this, we cannot do this. I said, you will do

this. This is our hospital here and I expect you to help us. He eventually came around. So the first baby born here is a Gravenstein baby, [born] in December 1958.

R: Which child was that? I know you had two when you came here?

G: This was two later because we had one in Bonn, we had one in Basel, we had one in Copenhagen and we had one in Boston. This was the first of four in Gainesville.

R: Number five.

G: He made arrangements that we could take the baby into the newborn intensive care unit, where it really didn't belong. It all went down fine. We have a picture of Prystowsky, my wife, the baby, and me from that particular day.

R: Do you remember the date of that? I have a copy of that picture.

G: December 10. I hope it's [December] 10, I hope it's not [December] 12.

R: I'd like to hear a little bit more about Dr. Harrell.

G: Dr. Harrell was a wonderful guy. What impressed me most, being somewhat romantically idealistic at times, were his ideas of what was proper for an academic institution. One of the things that he considered to be improper, and he would let everybody know about this, was to drive an ostentatious car to work. The word was out that he did not wish to see any expensive car driven by faculty and parked in front of the institution. This included Mercedes and Cadillacs and BMWs and things like that. The other thing, equally idealistic in final analysis and practical, was that we all had to serve in the general clinic. Whether you were an anesthesiologist, an ophthalmologist, a gynecologist, a psychiatrist, it made absolutely no difference. You had to spend, I think it was, one afternoon a week staffing the general medical clinic. I went there and I saw patients with gyn[ecological] problems and God knows what. [End of Side 2, Tape A]

R: We're still talking about the early years at Gainesville.

G: Let me just mention one thing. We were talking about [Dr.] Harrell [and] his idea of staffing the general clinics, which was fun. [It was] easy for me because I had just finished medical school, much more difficult for some of my colleagues who had finished their specialty training and had forgotten about some of the basics or were not up-to-date on it. The other thing is, he wanted for the medical students to have little white coats [or] jackets. He specified that they had to

have big pockets because students would always carry all sorts of books and handbooks and pocketbooks in their pockets, stethoscopes and hammers. There was this atmosphere of delight in medicine and idealism and a certain scorn for anybody who would even dream of doing this for something other than high ideals. Once again, money was of no consequence, but the other way around this time. The pay was very poor.

R: What were you paid during the first year?

G: My first salary was \$16,000 a year.

R: Had you interviewed anywhere else?

G: I had been offered a couple of opportunities to go elsewhere but I had never really seriously considered any of them. Not as chief, but as an associate or an assistant professor. The preparation for my coming here was also very nice. Woodward apparently liked me, and I liked him. When he wrote his letter of recommendation to the medical school and to the university to have me employed, there appeared this wonderful sentence which said I had published well over a dozen articles. It was exactly thirteen.

R: Did the salary compare favorably with the other offers you had?

G: I don't recall that. Certainly, it wasn't lucrative. In private practice, people were getting two or three times as much at that time.

R: As anesthesiologists?

G: Yes.

R: Did you ever consider that then?

G: No.

R: You were always interested in being in a teaching hospital.

G: I've been in academia as long as I have been around.

R: That's your niche.

G: Right.

R: What were the students like? When you came in, the first two classes had started.

G: The first two classes were relatively small. We didn't get to see all that much of the students. I think I did some. Because of my good relationship with Tom Maren, which lasted as long as he lived, I got invited to give lectures in pharmacology, which I did, and we did some dog experiments to demonstrate the cardiovascular effects of pharmacologic agents. Clinically, the students had an elective, but anesthesia was really not glamorous. As a matter of fact, it was considered to be the pits.

R: Any particular reason for that?

G: I think that it had to do with the concept that it had nothing to offer scientifically. It was a craft rather than a specialty. If you failed in surgery, you would wind up in anesthesia. Nurses could give it, therefore why waste anesthesia physician time on it? That feeling was very pronounced and made it very difficult to recruit good people into the field. For many years, we had a terrible time recruiting. It changed only in the 1980s when suddenly anesthesia became respectable as a specialty and people began to flock to it and we had all sorts of M.D./Ph.D.s and top of the class and AOA and so on.

R: Were you doing research or did you start out doing research when you came to Gainesville?

G: Yes, we did. We did some animal experiments. We had some NIH [National Institutes of Health] grant support. We had a training grant. We did quite well and we published papers. I had students and did some things myself with my colleagues.

R: What was the exact nature of that research?

G: We did some work with cyclopropane, which is an anesthetic agent which has interesting cardiovascular effects. We did some work with thyroid hormone. Fregley, I don't know whether you know him or not.

R: I know of him.

G: He was in physiology at that time [and] helped us design these things. We did some things with pain questions. We had one study with a student on the effect of anesthesia on paramecium, on their motion, cilia. I invited another colleague from Boston to help expand the research program, William Brewster, who was a brilliant guy, very low-key, just as bright as they come. He had made a name for himself. I had high hopes for him to strengthen the research part. Unfortunately, he became ill. He found out that I had been a spy for the Nazis and the Communists simultaneously and he reported me to the FBI [Federal

Bureau of Investigation] to have me investigated. Well, I hadn't been. So it was his problem rather than my problem. The poor fellow developed schizophrenia and we had a terrible time dealing with this, locally. Eventually, he had to be institutionalized. His wife signed the papers to have him committed. In those days, in order to be committed, you had to spend some time in jail, in county jail. You had this brilliant friend and colleague sit in jail until the papers could be processed where he would then be admitted to [the institution in] Macclenny. Just heartbreaking. He eventually came back, but couldn't really get reintegrated and left and worked for the government until he found out that the commanding general was a Communist. That didn't work well.

R: Did the FBI take his accusations seriously?

G: I don't know. I don't know how far this went. I never saw any FBI agents in the bushes.

R: They never actually interviewed you or anything?

G: Not that I can recall.

R: That is tragic.

G: Yes, it is a horrible thing. Of course, these things don't spare anybody. You can be brilliant. Which reminded me of this [A] *Beautiful Mind* movie, have you seen that?

R: I have not seen it yet, I would like to.

G: Many people like it, I didn't.

R: Anything further about your early research in the last few minutes or so?

G: Instead of early research, let me mention one thing on Gainesville at that time. *The Gainesville Sun* had a column in which they reported who had been admitted to Alachua General Hospital and what the diagnosis was. [For example,] Mrs. Snyder is going to be admitted to have her gall-bladder removed on Friday. That was Gainesville.

R: How large a town was it back then?

G: I think 25,000, something like this. Those of us who have been around for this are just absolutely amazed at the current [growth]. Indescribable.

R: I guess the same sort of exponential growth really happened at the medical

school as well.

G: Very much so.

R: The first classes were made up of about forty students. The classes are now huge, the faculty is much larger. What was the faculty like? I know that Dr. Harrell had a certain vision when he was hiring people.

G: We were all young. I was thirty-three as the first chief of anesthesia. I look at my children and I say, my goodness. Imagine that. Woodward, I think, was forty or so. Harrell was in his early forties. Everybody was at that level. We were all young and we were all fairly homogeneous in our background in terms of recency of training. We all came from respectable institutions. I had some struggle to establish anesthesia as something respectable and worthwhile. I had one colleague, who is still alive and therefore I won't mention his name, with whom I had to deal and I couldn't do what he wanted me to do because I thought it was wrong and I shouldn't be doing it. He had been a bombardier during World War II. In one moment of utter frustration with me, he blurted out, I wish I had hit you. I mentioned this recently to his daughter, this anecdote. She said, how very typical of dad.

R: With that I will end the interview with Dr. Gravenstein on January 17, 2002.

[End part 1 of interview]

R: This is Nina Stoyan- Rosenzweig. I am continuing with the interview of Joachim Gravenstein. Today is Tuesday, February 5, 2002. We left off around 1959. We were talking about the early years of Florida, Gainesville in the 1950s. We didn't really touch a lot on your research. I'd like to spend some time just talking about your early research and the development of your research program. You've had quite a few patents as well as an extensive list of publications.

G: From a personal point of view, my research in Boston at MGH was involved in the subjective response, as Beecher used to call it. [This] was the concept that a physical event, such as pain produced by a cut or injury or something like this, is associated with a psychologic event and a subjective response to this physical thing. Beecher believed that the drugs that we are using have as much an effect on the psychologic response as they do on the actual physical biochemical cascade of stimuli and reactions in the body. He became quite well known as a [proponent] of this subjective response to pain. Interestingly enough, this has now changed almost completely and [today] we are talking almost only about biochemical reactions on the cellular level and we're trying to locate the action there. More or less ignoring the subjective response to this, which is far more rigorously scientific and less psychologic, sociologic. Beecher used to make the

point that identical injuries suffered by a soldier on a battlefield was quite different from the one suffered by the breadwinner in an automobile accident who was going to be out of a job and out of work and out of income and so on. Whereas for the soldier, it was a ticket home out of a very nasty situation. He claimed that the requirement for narcotics were far less for the soldier than they were for the civilian injury.

R: Maybe, to a certain extent, a soldier is somewhat prepared to face that sort of pain, where as in an automobile accident, it's unexpected and it comes on you suddenly. I don't know how much preparation can allow you to face pain.

G: It's an interesting point. Even though, typically, young people do not believe themselves to be subject to injury or death. Otherwise, you'd have no volunteers in the army.

R: That's true. You think that with soldiers, there's an element of denial?

G: I think it's very strong.

R: To a certain extent, it seems that the interest nowadays is more on the biochemical, the cellular level. That seems to be true of medicine in general, not just anesthesia.

G: Very much so. The other side gets a little bit pushed out as being almost voo-doo type medicine. Holistic stuff and things like that. It's very interesting. In today's medicine, the naturopaths, the homeopaths, and people whom traditional allopathic medicine considers to be fringe folks, like chiropractors, they still strongly emphasize this psychologic effect. Allopathic medicine doesn't, to a degree.

R: You can't measure it.

G: Beecher thought that you can measure it. He had, with some clever statisticians, worked out pain scales. Which, in one way or the other, we are still using today. We have these analog scales where people have to say, my pain is, from 1-10, a 2 or a 5. Make this even visual by drawing a line with a 0 and a 10 at the end and say, where are you? That sort of thing. Anyway, that's what I did in Boston. Then, when I came here, we did some autonomic pharmacology in animals and also in volunteers. Published several papers on the effect of atropine and scopolamine and ephedrine and methentermine and so on. Descriptive more than anything else. We stumbled on some interesting things which were interesting but not earth-shaking. Those were the early days in research here. We got an NIH training grant for teaching people research in Gainesville. This was the days when the NIH was supporting anesthesia,

recognizing that it wasn't doing well as a specialty. This was the main thrust of the department at that time. Later on, much later, we did some other things.

R: What were you learning? You said it was interesting but not earth-shattering. What was the result?

G: For instance, we observed that the drugs atropine and scopolamine, which were described as blocking the effect of the vagus nerve, also had a stimulating effect. In small doses, they would mimic the effect of vagal stimulation. Much later, people began to document this in animal studies, where they took readings off the nerve itself and saw that the traffic on the vagus, parasympathetic nerve, was increased by doses of atropine and scopolamine. But then the peripheral blocking effect obscured this central stimulating effect, so what the clinician usually saw in ordinary clinical doses was just the blocking effect. With scopolamine, the stimulating effect becomes quite noticeable once the blocking effect vanishes. You then see a distinct vagal overpowering effect and heart rate slows. This lasts for quite some time, it can be documented fairly easily.

R: Does that increase pain levels?

G: It has nothing to do with pain. It's just the autonomic nervous system.

R: Were atropine and scopolamine new drugs at the time?

G: No, they're old, old, old drugs. They've been around for centuries.

R: What led you to work on those drugs in this case?

G: I cannot recall what triggered that interest. This wasn't the hypothesis we were testing. We didn't know that we were going to see that. It just came out and we observed it. We first didn't quite know what to make of it. We published it and described it and only much later it became apparent to me that the central stimulating effect was there and usually just obscured.

R: Did that have any impact on the use of these drugs?

G: Not really.

R: It was just a better understanding of what it was doing to the body?

G: It's one of those little mosaics of which this institution is full of. If you take all the research that is going on, you could probably easily discard 95 percent of it without setting back our progress in medicine. It's an awful lot of cleaning up and doing a little bit here, finding something there. Makes people happy but it really doesn't help anything one way or the other.

R: Do you think that by filling in the overall picture it can be helpful in the future?

G: It might. Every now and then there's something that eventually everybody takes note [of] and makes something very important. An awful lot of this is going to be forgotten very quickly. The problem is it's like acorns. An oak sheds I don't know how many thousands and thousands upon acorns. Just relatively few oak trees will grow out of that. Same sort of thing.

R: You can't necessarily tell in the beginning what's always going to be earth-shattering.

G: You cannot, no. You can also put this into human reproduction and sperm – millions and millions and just one little child. It seems to be a very biologic phenomenon to have research going on, much of which is eventually forgotten, but it is necessary as a fertile ground for other things that need to grow.

R: What is the value of having all this information or research, even if it isn't necessarily earth-shattering?

G: We also have the question in teaching medical students [as to] what is important and what's not important. We just go ahead and we plow in there and we teach everything we know. An awful lot of it is completely useless. We don't know that it's completely useless. The poor students, of course, can't tell what's useless and what's not useless. So they are burdened with much stuff for the sake of satisfying the teacher and the curriculum. Stuff they never, ever use again.

R: You could argue that's the case with things like organic chemistry.

G: And history.

R: I would argue that history is useful in that it should give physicians a sense of humility.

G: I'm, of course, pulling your leg. Why do you need to know about George Washington? You don't even have to do medical history. Could you become a decent human being and do your job and rear a family without knowing about George Washington and the United States? The answer is clearly, yes, you could. You can then get into some profound academic discussions of basic philosophy and society and feeling of cohesion within the country.

R: There are people who just genuinely grow up having an interest in history and want to know. Perhaps there's something in the human animal that wants to

know what happened before and that enjoys a sense of being grounded in the past. It is the details of what they should learn that you could argue about.

G: I think it always comes back to this same sort of thing. There's an abundance of things that are available to us and if you can enjoy it and participate in it and relish it, wonderful. [Picking out] individual items to say that [they are] essential becomes very difficult.

R: In developing a medical school curriculum, people say, well, they won't necessarily use this knowledge, but we're teaching them how to think, how to solve problems.

G: Like Latin [being taught] in school.

R: You could argue that Latin helps you understand the English language.

G: I know. I had that argument with my kids. Having grown up in Germany, I had Latin and Greek. The question is, what good [it] does you, other than to be able to derive some medical terms and give the sense of belonging to a fraternity that speaks the same language.

R: I taught English composition at Washington State University. One thing students want to know is how to spell words. It's hard to teach spelling, you just have to memorize words. If you teach them something about Latin and Greek roots, they can make educated guesses about the meaning and the spelling of words. It can help with their vocabulary. To a certain extent though, it's the argument that, it can be helpful but in what dose?

G: I think society settles down and is sort of enjoying a rich texture of all these different bits of information that are available, all of which are incorporated into – I'm going to get very poetic here – some sort of fabric of life for us. I didn't even mix metaphors here.

R: In retrospect, do you look back at your research and think it wasn't immediately relevant? Are there things that you took out of it that you used in later research?

G: Every now and then, a question pops up about the drug and the usage. Then you can add something to the discussion. It isn't earth-shaking. I think eventually I did some earth-shaking things. [Back] then, [those] were not the earth-shaking things.

R: How long did you research autonomic responses?

G: Well, I was here for my first time from 1958-1969 and I think, during that time, it

was practically all clinical pharmacology. We also got involved in something else, come to think of it, having to do with manpower. We had such a terrible time attracting people into the specialty. We, and most other departments, had that same difficulty. Anesthesia was considered to be a lowly-regarded specialty. The question comes up, this sort of ties in to what we've just talked about, what do you need to know in order to do the technical aspect of anesthesia? You can begin to define this. Of course, all of us live in a system where we do many things for which we are overtrained. You turn on your tape recorder, you're vastly overtrained for turning on a tape recorder. It all fits into this. When you begin to break down the job of an anesthesiologist or a surgeon or an internist or any specialist, you could delegate this, that and the other thing without any difficulty, [but] would it help you to make you any more efficient and decrease cost and be able to get by with less expensive manpower? Then you get into some interesting questions [as to] what you can do. In anesthesia this has been going on. In some other fields as well. Obstetricians have midwives. The ophthalmologists have optometrists. The psychiatrists have psychologists. The anesthesiologists have nurse anesthetists and so it goes.

R: Were you arguing for training nurse anesthetists?

G: Yes, in the United States, the manpower situation was grim. The American Society of Anesthesiologists had done what I considered to be a stupid thing in declaring war on nurse anesthetists instead of helping them and training them and working with them. [This] caused enmity between the two camps from then on. It goes back to the early 1950s, and maybe even earlier than that. Yet, it was obvious that physician anesthetists or anesthesiologists could not satisfy the requirements for anesthesia services in the United States. There clearly had to be somebody else to help, and these were nurse anesthetists. As physicians, I always argue, we should extend our hand and make sure that patients taken care of by nurses get the best possible care available. That's our responsibility. That view was not shared by the majority.

R: Did you develop a training program for that?

G: Yes, we did. We started a training program for nurse anesthetists in Gainesville. The Florida Society of Anesthesiologists summoned me to appear before them. I put the facts in front of them, [showed them] what was actually going on and what it would take to cover the needs for anesthesia services and I saw no way out other than to rely on nurse anesthetists. They censured me. I was publically censured. This was transmitted to the ASA, the American Society of Anesthesiologists in Chicago with the recommendation that members of my faculty should be excluded, expelled from the union, for doing things that were just too awful to contemplate. The ASA didn't do anything about it. I didn't stop doing what I was doing. There was sort of a cold war going on between

Gainesville and the rest of the state.

R: How did the other anesthesia faculty members react to that?

G: The faculty was fine. They didn't desert me or the ship. We continued doing what we thought was right. Eventually I left, not because of this, but because I was stuck here. I couldn't make it go any further.

R: In terms of your research?

G: In terms of the growth of the department.

R: How large was the department at that time?

G: Small. We had maybe six or seven faculty [members] and an equal number of residents. Something like that.

R: Does the data that you used to argue for nurse anesthetists show the number of surgeries that take place on a given day in comparison to the number of available anesthesiologists?

G: Yes. I think the data were just absolutely irrefutable. You could not escape it and you still can't escape it. Even today, I don't know what percentage of cases are done by nurse anesthetists, but it's a sizeable percentage, close to 50. Both nurse anesthesia and physician anesthesia have grown in parallel over the years. My successor here, Dr. [Jerome] Modell, continued the training program for nurse anesthetists for another fifteen years. When I came back, after having been gone for ten years when I was a chairman at Cleveland at Case Western Reserve, this training program continued.

R: Is it still in place?

G: No. The golden 1980s came and suddenly there was an abundance of physicians who wanted to go into anesthesia. Modell, at that point, discontinued the program.

R: Are there still many physicians who want to go into anesthesia?

G: No. We have had another dip in the number of people who went into anesthesia. That's a very unhappy occurrence because the medical schools and the deans and our dean here actively discouraged medical students from entering anesthesia training. Not only here, but anywhere. To have to compete with the advice of the dean did not make life easy for us and for other programs. The arguments the deans used is [that] anesthesia is going to be overpopulated

and you won't have a job and there's going to be a shift in paradigms, whatever that means. There's going to be primary care and there's going to be less unnecessary surgery. There will be preventive medicines, so the operations won't even be necessary because this will all be taken care of. Completely asinine, stupid, idiotic statements. Permit me to say that. Of course, we were proven right because we are far away from having solved cancer. We certainly haven't made a dent in vascular diseases, degenerative diseases, trauma. All of which require surgical interventions. The dip that was caused by this very misguided statement [and] attitude caused us to have great difficulties. Suddenly, the private-practice people [in anesthesia] started screaming, we don't have people, we don't have people. There was a new influx of residents which is just now beginning to become noticeable again.

R: It's more of a boom-and-bust cycle.

G: That is very much true. Previously, in the 1960s, there was a [similar event]. The government tried to persuade people to go into family medicine where people were needed. The backlash of this was that we eventually had quite a few general practitioners who came into anesthesia. They said they were dissatisfied with their practice because when they had an interesting case, they had to send it to the nephrologist or the surgeon or [some other specialist]. They felt that they were reduced to the sniffles and the sneezes.

R: And referring people?

G: Referring people [like a traffic cop].

R: Has the attitude of the profession toward nurse anesthetists changed at all?

G: Not at all. If they could send each other poison pills or letter bombs they would do it. The nurses now also hate me because I have once again...what happened was [that] in the 1960s, when I started working with the nurses, I said, come to Gainesville and we will spend every six to eight weeks and afternoons on Saturdays when you are free and I will make time, we will do some continued education for you. The nurses came from all over the state. There were nurses who said, I think I know more physiology and pharmacology than my surgeon. Couldn't I become an anesthesiologist? We looked at their background and it turned out, at that time, they had high school and maybe two years of nursing education, frequently hospital-based. If they wanted to go to medical school, they would face four years of college, four years of medical school and then training in anesthesia because the ASA wouldn't give them credit, which was ludicrous, for what they already knew. I said, this doesn't make any sense, this [nurse anesthesia] educational pathway. What we ought to do is take people and put them into college and incorporate, in college, stuff that they could use to

make money as technical people in anesthesia. Then, if they want to go to medical school, it's going to be open for them. They can become anesthesiologists, they can stay on the technical level, whatever they'd like to do. This concept, we developed here in Gainesville. I eventually put [it] into effect in Cleveland, where we started such a program. Now the enmity between ASA and the nurses is so great that ASA now begins to say, this may be a good idea. Unfortunately, for the wrong reasons. It's once again a hostile action rather than the idea of doing something that makes educational sense.

- R: How much background and training do you think somebody needs in order to be an anesthesiologist? What should distinguish a physician anesthesiologist from a nurse anesthetist?
- G: The physician anesthesiologist is a physician underneath and therefore has had training in internal medicine and surgery and pharmacology and pathology and so on and so forth. He or she can bring expertise in terms of the patient's underlying diseases and requirements and interactions between anesthesia and these diseases. On the technical level of how to inject the drug and how to turn on a ventilator, or how to intubate somebody or how to ventilate or when to recognize that something is happening – you don't have to go to medical school for that. There is an ideal [team] there somewhere but we certainly haven't worked it out. The problem is not so much in the big centers where this team of physician anesthesiologists and technical anesthetists can be worked out to be efficient and effective. In the small community hospital that may not work because you have too few people to spread it.
- R: It seems like the ideal would be a division of labor where the anesthesiologist decides on which drug to use and someone else would then carry out the plan.
- G: Right, that sort of system [is ideal]. We've examined this and we've published some papers on task analyses and things like that. That sort of thing works and in practice, of course, it does work. There are many places where people now have technicians and nurses and they're working in teams. Sometimes, this is abused, where lazy anesthesiologists don't get involved enough. Other times it gets abused because there is too much supervision. There's a happy medium.

[End of side B1]

- R: At small hospitals, people are more generalists anyway and a teamwork system can't really exist, just because they don't have enough people.
- G: Hopefully, there would be an opportunity for the small hospital to send their sicker patients to a center where things get done better. This is something we did in Cleveland that I think I mentioned, that we had a tele-medicine link to a

small community hospital there.

R: We didn't talk very much about Cleveland. You went there in 1969?

G: Yes. They made a very attractive offer and they had biomedical engineers that I could work with. Since we had looked into all of these things, the question of monitoring came up. There was an atmosphere that was attractive, academically, to me. It worked out very well and I had a good time, professionally, in Cleveland.

R: How were things different on a daily level? What were you doing there that you couldn't do here?

G: I think it was primarily [in the] contact with the university part of the school. Case Western Reserve is a small university in comparison to the University of Florida, which is a monster. The contacts with a very distinguished engineering faculty were easy to have. The school itself was very proud and well-established as a medical school, much older than the University of Florida. There was an opportunity to grow and I had felt that I had plateaued in Gainesville. I couldn't grow anymore.

R: You went in as the chairman of the department. How large was the department when you arrived?

G: In Cleveland, [we had] probably ten faculty. We had the same problem with residents. It took us some time to get that going.

R: What was the connection with the small rural hospital?

G: Once again, [this was an] inner-city hospital. I was working with a physicist who had developed a laser beam in which he modulated the frequencies of light in order to send signals. He used this as a signal transmission and he was able to put television and voice on his laser beam. We shot a laser beam from the roof of Lakeside Hospital in Cleveland to a receiver on a 100-bed community hospital in the inner city in Cleveland. This was a very poor hospital with very limited resources, both in terms of manpower and sophistication. We set up monitoring stations in the operating room and we had one of our faculty sit in front of the TV screen and he or she was able to look around in this operating room and comment on what might be useful to do. We also set it up so that we could make rounds in the intensive care unit. Our intensive [care physicians] would help the physicians in the small hospital to make rounds. It's a very innovative concept and the technology underlying it, with a laser beam rather than microwave, was making some extra sparkle.

R: Did you start this right away?

G: Within a couple of years.

R: Is it still in existence? Did the program expand?

G: No. No, the program did not expand. The little hospital fell prey to the development of the other forces that eliminated small hospitals. This was an inner-city hospital which was particularly disadvantaged. It eventually closed its doors. We [wrote] a couple of papers out of it and that was it. We learned an awful lot. Now people once again are talking about tele-medicine. Of course, technology has improved tremendously in the meantime. The laser beam was still sensitive to, for example, a heavy snowstorm. Couldn't go through there. Rain, it did okay with, but not too heavy rain.

R: What about birds flying through the signal?

G: That would be just, poof! They would be gone. If a pigeon sat in front of it, I don't know whether the laser beam would have pierced it and cooked it.

R: That never happened, apparently. Did you move your whole family at this point? Did you have eight children at that point?

G: Yes, by then we had all our eight children and we moved all of them to Cleveland, had a big house. Several of them went to Case Western Reserve University. They had a tuition program for faculty which made that possible.

R: What was Cleveland like?

G: Cleveland, when you land at the airport, it says, the best location in the nation, which is written by somebody from Cleveland. The inner city had a bad reputation in terms of riots and in terms of pollution and crime. I'll never forget when I was recruiting people, this must have been 1969, I met two colleagues at the airport and I didn't have my car up there. I told the cab driver not to say anything negative about Cleveland, that I was trying to recruit these two guys and I didn't want to hear a peep [about negative things]. We started driving and the first corner he turned around, he said, this is where the lady crashed and her heart was used as a heart transplant. I thought, this was getting close, but we still made it all right. Then one of my guests asked the cab driver, have you ever been robbed? From then on it went downhill. He said, yes, three times. The first time, and he reached under his seat and said, I shot the guy. Got a gun underneath here. The second time, he used a knife to knife his would-be robber. The third time, he said, the guy almost got away but I ran over him. Cleveland as a city free of crime, we could not establish in this trip from the

airport to the hospital.

R: He certainly showed that the citizenry could defend itself.

G: Yes, he did.

R: What kind of research did you do at Cleveland?

G: In Cleveland, what we did had to do primarily with engineering. We had several grants supporting research on monitoring, monitoring technology, and this laser thing. Those were the more important aspects of it. I built a new monitoring system in which we tried to correlate the different signals that come in from patients to evaluate them, a better way of obtaining an automated record, which at that time wasn't available. We were one of the first ones to do that.

R: You have several patents.

G: Those are all from later times, from Gainesville.

R: You did that work when you came back to Gainesville.

G: I am not an engineer. I am, emphatically, not an engineer. As a matter of fact, I always tell my engineering friends, if I could have managed to do square roots in school, I probably would have become an engineer. Since I couldn't do that, I had to go into medicine. They eventually granted me a certificate which actually hangs on my wall, which says J. S. Gravenstein, Ace Engineer. Underneath, in small print, it says, this entitles Dr. Gravenstein to use terms he doesn't understand, such as....

R: At least you can work with engineers to solve problems.

G: We work exceedingly well together. They needed to explain things to me, which was good for them, and I had to explain things to them, which was good for me. It was, mutually, a very productive system. As a matter of fact, one of the engineers whom I had hired in Cleveland to be the coordinating engineer for all these many activities later on worked for a big company. He came in the very early 1980s and said that I should run a course for engineers, that I should take a week [to] teach engineers something about anesthesia. I said, Howard, they're not going to come. Who's going to spend a whole week in Gainesville to learn something? He said, you try it. Well, we tried it and this April, late April, we are going to have our forty-seventh such course, which we have been running for engineers and marketing people from the industry. We've had over 400 people in Gainesville.

R: This is a week-long course?

G: It's a week-long course.

R: You must offer it several times a year.

G: Yes, we've had up to three a year. Recently, with the turmoil in the fiscal world and the merging of companies, things have changed a little bit. We'll have to see. Anyway, we are still running them.

R: What sort of teaching were you doing either in Gainesville in the 1960s?

G: In the 1960s I taught some classes in pharmacology. Dr. Maren and I got along famously. I taught, once again, autonomic pharmacology and anesthesia to medical students in their pharmacology classes. Then, of course residents, any number of residents.

R: What did you teach in Ohio?

G: In Ohio, it was similar. We taught some pharmacology of anesthesia and autonomic stuff, [taught] residents. We started a program for the technicians in anesthesia and we taught that. We worked it out with Case Western Reserve University so that it would offer a degree that [incorporated] all the requirements that medical schools make for students who wish to apply. They [would] have whatever the University of Florida wants their students to [have] in chemistry, physics, basic sciences, and so forth. In addition to this, we worked in some anesthesia courses and some practical exercises where they came into the operating room and upon graduation they would be able to function as technicians in anesthesia.

R: They would have that option of going on to medical school if they decided.

G: This worked very well. We had quite a few who did go on to medical school, some of whom eventually did wind up in anesthesia, others in other specialities. Others stayed on the clinical level, practical level. I thought that was a big success. The problem we had, in those days, were the politics of it. The nurse anesthetists were quite unhappy.

R: Why was that?

G: Because they thought this was competition. We were working hand-in-hand with anesthesiologists. I think that it probably helped the nurses improve their training programs because they felt the fresh air of competition.

- R: They saw that you were training technicians who weren't going to be nurses, but who could administer anesthesia.
- G: Right. The nurses argued, I'm not so sure very successfully, that you had to be a nurse and you had to have the compassion and certain nursing skills to do anesthesia. Just as I argued you have to be a physician, [with certain skills] to be an anesthesiologist.
- R: Was anything resolved with the nurses?
- G: No. I think that the ASA is persuaded that [the nurses] have joined Al-Qaeda [terrorist organization], and vice versa.
- R: How long were you in Ohio?
- G: Ten years.
- R: Did you build up the department?
- G: I hope so. It had been a division of surgery. I think there came a point where my predecessor at the university developed some problems. He left and they were looking for somebody new and decided at that point to make it a department. I interviewed there and was intrigued by the possibilities of [working in] a distinguished medical school. I went there and I think the department had grown considerably. There was very little research and very little innovation going on before I was there. We certainly changed that.
- R: How large was it when you left?
- G: When I left, there was a faculty of twenty or so, and an equal number of residents. Something like that.
- R: So it doubled in size?
- G: Oh, yes.
- R: Had you actively been looking for jobs or did they come to you?
- G: I don't recall that. I think they must have written me, because otherwise I wouldn't have noticed. Dr. [Emanuel] Suter [dean, University of Florida College of Medicine, 1965-1972] and I always got along well, but I felt that I didn't have his support anymore. He wanted to put emphasis elsewhere. He was dean at that time.

R: Did he focus more on education?

G: I don't know. Anesthesia was working okay and we stayed out of trouble. There was no sense of expanding it. It's sort of the impression I have. Deans have a tough time.

R: They can't please everybody.

G: No, they can't. Frequently, it's a question of changing [a] chairmanship in order to make the next advance in a department, which is destructive but apparently necessary.

R: What made you come back to Gainesville after ten years?

G: I had some health problems and, at that time, decided that I should probably stop being an administrator, which causes anxieties and stress and tension. They invited me down here to be a visiting professor. I came down and sat down with Modell and he said, how about coming back to Gainesville? At that time, they had made available this graduate research professorship which they offered me and I accepted, with the condition that I would not have to be an administrator. Modell stuck to that. My current chairman still honors that.

R: Who is the chairman?

G: My son.

R: You came back more as a research professor?

G: The title is graduate research professor. But I did clinical work when I came back, quite a bit. The university looks at the graduate research professorship, which I think they are phasing out, as a mechanism to have professors who have established themselves as investigators help young investigators get going. When I was here as chief and then chairman, there was a graduate research professor in surgery, Dr. Dragsted, who had followed Ed Woodward. Woodward was a disciple of Dragsted. Woodward had invited Dragsted to come as a graduate research professor. I knew him and he was highly respected by everybody. Very nice gentleman. I helped him every now and then with translating things into German. He was world-renowned for his work. At one point, he asked me to translate a paper that he was going to read in Munich at a surgical congress and I did. He wanted to practice this with me and we did. Then he said, I don't think I can do this. Why don't you do it? So he invited me to travel with him to Germany and paid for it. I was to give his talk and he would sit in the audience. I would be [the] interpreter, which we did, worked fine. Afterwards, being such a famous man, they had an interview on the radio with

him. I once again served as an interpreter. They asked him to explain his theory of gastric ulcers, which he did. He said this was stress-related, vagal influences, and acid forming. People who had no stress and were not prepared to be stressed didn't get ulcers. I think he's wrong on that, [was] eventually shown to be. Nevertheless, that was the theory at the time. Then he gave an example, this is on German radio in 1959-1960, [that went] something like this, he said, for example, your president [Paul] Hindenburg [German general and president, 1925-1934] when he ran against Hitler. I think that's probably the first time Hitler's name was mentioned on German radio. I thought, oh my God, we're going to get ourselves into some horrible, horrible mess here. The story that he then related was that the election which brought Hitler to power was a fairly close election and Hindenburg, with his staff, was listening to the radio for the incoming results. At 9:00 he pulled out his watch. I still remember Dragsted looking at his watch and saying, it's 9:00 and I retire at 9:00. Everybody said, General or Mr. President, we have to wait a little longer to get the results. [Hindenburg] said, it makes absolutely no difference at this point whether I know the results now or I know them tomorrow morning because it's not going to influence the results, so good night. Dragsted used this story, whether true or not, to demonstrate how you could be above things and you wouldn't get an ulcer.

R: He didn't get in trouble for that story.

G: No, he didn't get in trouble.

R: When you came back and you were the graduate research professor...

G: When I was the graduate research professor, Dragsted had died. He was in surgery and I was in anesthesia, so it was different. I don't think surgery has a graduate research professor now. I'm now an emeritus.

R: Was that the period when you developed your patents?

G: That time we started on several developments. I told you about the course for engineers. We started the simulator project, which was a huge success. A Gainesville development in our department got started in the mid-1980s, when a young resident came to me and said it was such a shame that we were taking young students fresh out of medical school into the operating room, and then before you knew it the patient was asleep and intubated and things were underway. There was a very sick patient and [an impatient] surgeon. It was so rapid that he didn't really understand what on earth had been going on. Couldn't this be slowed down and couldn't we demonstrate these things and practice them in a simulator. This was the beginning of the development. This fellow, Mike Good, is now chief of staff at the VA [veteran's administration] hospital here. He

deserves most of the credit for pushing this along. I supported him as much as I could. The simulator technology that was developed here was subsequently licensed to a company that is now building the simulators. I was just told last week they have sold over 200 now, worldwide. This is one of the really remarkable success stories. There are a number of patents involved with that.

R: Is it a computer screen simulator?

G: No. It's a mannequin, a plastic man who's breathing spontaneously. You can listen to his heart and breath sounds. He has a blood pressure, cardiac output. He has a bunch of very sophisticated mathematical models that represent the cardiovascular and the respiratory system. He responds to all sorts of drugs in a correct way. You can make him into a twenty-year old healthy person or you can make him an eighty-year old, very sick, hypertensive, diabetic, [with] pulmonary disease, myocardial infarction patient. You can then watch the effect of drugs on this system. It's a very striking thing. It's a Gainesville development.

R: Who has invested in it? Have medical schools invested in this idea?

G: The medical school has been aloof. The medical school has always said, this is a wonderful idea, why don't you go get some money for it? The support of the medical school has been minuscule. You probably would have to get into this in a major way to understand exactly what happened in the late 1980s and early 1990s. Fortunately, the department of anesthesia was a wealthy department. Modell was very proud of it. The anesthesia department made it possible to develop this and made space available and funded some personnel for it, without which it would have been difficult to get going. We also obtained some funding through the Anesthesia Patient Safety Foundation, of which I was a founding member and I was on the executive committee. The companies became interested and they put some money into it. We were at a point where, at times, we had ten to twelve engineers working on the project. It was a major effort for the department to keep this going. Then we came to the point where we knew we had something worthwhile. We thought perhaps we should manufacture this in Gainesville. We had dreams of renting a place and then having people put this thing together and sell it. Fortunately, we were smart enough not to do this, but to get a company that has the engineering skill to do this. The Loral Company, [which is] known to build flight-simulators for the Air Force, took it on and the group involved in this has expertise that is just mind-boggling in terms of simulation. They took it on and the group that first worked on it split off and formed a separate company. I assume they still have ties to Loral, but I'm not sure about that. Anyway, it's highly successful.

R: Were the engineers already at the university or did you bring them in?

G: One of the people I had brought in was Jan Beneken who had been interested in this monitoring stuff already in Cleveland. I brought him into Gainesville to help us with this. He, in turn, had sent quite a few of his graduate students to Gainesville. So we had an Axis, not of evil but of good, between Gainesville and Eindhoven, in Holland. We still have some of his graduates working here who, in the meantime, have been absorbed into the system. Jan van der Aa was the first one, who is now director of something or the other for computers for the Health Center. Hans van Oostrom, who is still [half] in the anesthesia department and half in the engineering faculty. Last year, we had another student here. At times we've had, as I said, five, six, seven, eight, nine, ten students working on one or another aspect of this. Very, very successful.

R: And very exciting.

G: Very exciting and very gratifying to see. We use this extensively. This morning at 7:00 I was there to take care of a resident, who, however, didn't show up. Happens every now and then. On most mornings, I spend half-an-hour, forty-five minutes with a resident going through simulator exercises that they may not see in the operating room, or clarify things where they still have confusion or know nothing, whatever. In the meantime, the simulator has traveled worldwide. One story that I always like to tell [is about] a meeting we had in Kuala Lumpur in Malaysia, a big Asian meeting, [with] two or three or four thousand people attending, anesthesiologists. The wife of the prime minister of Malaysia is a physician. Therefore she opened this meeting and came with her entourage. One of the highly visible things was this American simulator and I was to show this to her. She was surrounded by minister of health, minister of education, minister of this and that thing. The technician who was with me, as I explained the simulator, suddenly started [the simulator] winking at the Prime Minister's wife, which you can do by remote control. I very quickly had to give some pentothal to put this thing to sleep in order to get out of this embarrassment of having an American simulator wink at the Malaysian prime minister's wife.

R: What was her reaction?

G: I think she took it..

R: In stride.

G: Yes, it was no problem.

R: Apart from the simulators, how would you describe changes in the field over the time that you've been in medicine?

G: If you think of what happens in technology elsewhere, [such as] air travel. When

we came over, they had clippers flying across the ocean with propellers. My first trips back to Europe were still with propeller-driven planes. It's unimaginable now. The same scaled down to anesthesia. The same extent of change has happened in the field. Drugs have disappeared, new drugs have come, we have become far more invasive than we ever were. Our monitoring is just incomparably different to what it used to be. We can measure things we were never able to measure before. Anesthesia has become safer. The mortality has gone down significantly. In 1952, 1954 – I arrived in the States in 1952 – [it was] thought that 1 in 2,000 patients died from anesthesia. That is unimaginable today. Now, some people who are overenthusiastic think it's 1 in 200,000. The worst statistic you can dig up at the present time is 1 in 20,000 deaths from anesthesia. It's striking, striking differences. Patients feel much better, our ability to take care of post-operative pain is much better now than it ever was before.

R: Basically, have things changed for the better?

G: Much, much for the better.

R: What about medicine as a corporation or as a physician-patient interaction?

G: I think that two things happened. On the one hand, technology has contributed enormously with the MRI [magnetic resonance imaging] and CAT [computerized axial tomography] scan and non-invasive or minimally invasive surgical procedures and new procedures that never have been done before. Heart operations, brain operations, orthopedics, cancer surgery and so forth. All of that is better now than it was before. What has taken a hit in the process is relationship between physician and patient. What has been inexcusable, as far as I'm concerned, is organized medicine, in terms of its unwillingness to face the responsibility of patients who are under-served. The AMA [American Medical Association] deserves blame for that, and [its] leadership. We all do, I guess, because somehow we didn't manage to do it right. There has been lack of leadership. There has been lack of commitment. There has been lack of idealism. It's painful to see.

R: Would you say those problems are insurance-driven?

G: I think the insurance [problem] is really sort of a reaction to power position, lack of stepping in and doing what needed to be done. I think physicians were frequently just too focused on what's right in front of their noses, and not infrequently on their pocketbook, and not willing to look beyond that. We pay for it now. Our patients pay for it too.

R: In the terms of the care they're getting or just the patients' overall state of mind?

G: The patients, I think once they are in the system and everybody knows what they're supposed to do, the care is very good. If they are not in the system, the care is horrible. On the line between being in the system and being outside the system, the care is marginal. The patients complain, justifiably so. In the Anesthesia Patient Safety Foundation, we have a newsletter that the Foundation puts out. We devoted one issue to quality of care and it was one whole issue of complaints about the quality that had gone down.

R: When did you actually retire?

G: Well, I'm seventy-seven years old right now, so I think it was five years ago.

R: Is that a mandatory age?

G: I think so, yes.

[End of Side B2]

R: What have you learned about cognitive dysfunction?

G: Over the years, I have observed that patients who had anesthesia and surgery complained post-operatively for weeks and months on end of not being quite there or with-it. The first time I saw this was in Boston, as a matter of fact, when I was resident there, when one of our faculty had an operation and afterwards he said he couldn't do crossword puzzles because he couldn't concentrate. It took about half-a-year for him to get over this. Then over the years, I saw occasional patients where somebody came and they had a completely normal operative procedure and normal recovery and [was] discharged and back at work. Then three months later you saw them and they said, could this have something to do with anesthesia, I can't play bridge, I can't remember the hands that have been played. I always said, oh no, this has nothing to do with anesthesia because the drug goes completely away and we know how long it takes and there are hormonal problems that last for about a week or two, there's a pain problem. After all of this is gone, the drugs, the last molecule has left your body and this has nothing to do with anesthesia. Then I started a study of pulse oximetry. There had always been the question that all the monitoring efforts that we make during anesthesia may be useless. If you monitor blood pressure and heart rate and so forth, what do you really accomplish? Does it make any difference? The one monitoring modality that really should have made a difference was pulse oximetry, which means that you clip something on your finger and then you can monitor the amount of oxygen in blood. We know that lack of oxygen raises havoc with your brain and your heart. Therefore, if during anesthesia or afterwards, you don't have [enough] oxygen, you're entitled to become befuddled, if not have your brain destroyed if it lasts too long, or have a cardiac

arrest. When [the pulse oximeter] became available, I thought, what a wonderful opportunity to document the fact that monitoring makes a difference. I organized a study in Denmark, since I had ties to Denmark. (I [had] spent three months there [in 1954]). We prospectively studied 20,000 patients: 10,000 had pulse oximetry and 10,000 did not. That was okay at that time because the Danes didn't have any pulse oximeters. I made [some] available to them, through my contacts with industry and the Anesthesia Patient Safety Foundation, and we got fifty pulse oximeters to Denmark. They did this prospective study. Huge differences in terms of the frequency with which hypoxia was recognized in the patients who had pulse oximeters and who were treated and those who didn't have it and weren't treated. But when we then did the statistics, we could not show that it had an impact. I pleaded with my colleagues in Denmark to also do some studies on cognition. They had a small group of just a few hundred patients where they sent out a questionnaire afterwards and said, how are you doing? There was a slight difference between the patients who had pulse oximetry and those who had not, in favor of the pulse oximetry group. The others said, well, we get a little forgetful. It was self-reported and the psychologist said, forget about it, [such studies] are useless. Nevertheless, it [interested] me enough that subsequently I got together some of my colleagues in Europe to launch a prospective ambitious, large-scale, international study of cognitive dysfunction. We identified two experts in cognition in the elderly. One from Maastricht in Holland and one from Manchester in England who specialized in making these measurements. We put them to work in designing something that would stand up to the criticism of the experts. Then we ran the study and we did a power analysis, [found out] how many patients would we need. We picked a patient population that was most likely to show [the impact], elderly people over sixty. We said we are going to exclude brain and heart [operations], for obvious reasons. We insisted on two hours of [general] anesthesia, so everybody who has two hours of anesthesia is going to be in this. Finally, we had a control group. We thought that according to the statisticians, the study would take 2,000 patients to show something and if that didn't show anything, we could forget it. If that showed something, we had something. After about 1,000 patients the statisticians called us and said, you have a big difference. It was not in the first week, where we expected the differences. It was at three months, post-op. Ten to fourteen percent of patients who were sixty years and older who had two hours of general anesthesia had measurable two standard-deviations differences in cognition, as compared to the controls who had three percent or so. We suddenly had a very exciting observation. We published it in *Lancet* in order to make it available to the general medical community. Now, this is something that a number of centers are beginning to study. We in Gainesville, with Dr. [Terri] Monk, have a follow-up study and she, in the meantime, has over 1,000 patients showing very much the same finding. We don't know how it comes about. We have some inkling that it doesn't have anything to do with oxygen, that it doesn't have anything to do with low [blood] pressure, the two

things that we measured for three days post-op. It has something to do with something else. That, I think, is probably the most important contribution that I [will] have made to anesthesia. We don't know yet whether it has anything to do with anesthesia, it may be surgical.

R: Some sort of surgical shock?

G: Not necessarily shock, but maybe emboli that fly into the brain. We have some evidence in this direction. This is an on-going thing. Dr. Monk just got a big NIH award to pursue these things. Other people in the world are doing the same.

R: Is this a permanent change in cognition or does it seem to go away?

G: It's a very important question and we don't know that either. From what I have seen so far, and what I have heard from people who have written me, I think in some patients it's permanent. Now, whether these were people who, as we now say, were on the cliff of getting into some sort of trouble or not, is something we don't know yet. But suddenly, it becomes necessary to tell elderly people [who face a major operation] that you have a 10 percent chance of becoming forgetful. I continue to get letters from people who read something in the newspaper where this has been reported, saying my father [or] my mother had this and that and suddenly she could no longer be independent. It becomes a huge problem.

R: Is this just an effect seen in the elderly?

G: Dr. Monk did a study in younger people. It is much less frequent in younger people. I think it happens also, but to a very small degree, maybe 2-3 percent, something like this.

R: I had my appendix out about six weeks after my son was born. For a period of about six months I felt very mentally fuzzy and couldn't really concentrate. I also didn't know if that had anything to do with giving birth and all of that.

G: Post-partum depression type thing?

R: No. I didn't have any depression necessarily, or anger, just a general feeling of fuzziness, not feeling sharp.

G: It's a very, very disturbing thing because we are so liberal with this. This is still not widely appreciated. This is fairly new. It all started in Boston with me when I was a medical student. I worked in [B. F.] Skinner's [psychologist at Harvard, 1948-1974] lab.

R: The psychologist?

G: A psychologist who had this crazy notion that we do nothing except for self-reward. There is no nobility in the human soul. If you are altruistic, you are altruistic because it satisfies you, gratifies you, stuff like this. That's the guy. He was professor of psychology at Harvard. I worked for some time in his lab. He had rats. I thought it would be interesting to test whether or not these rats, after anesthesia, would find it more difficult to learn, because the theories of anesthesia suggest that maybe there is something happening to cell membranes and [whether it was] reversible. I did this in rats who had to learn Skinner boxes, run the maze and stuff like this. It was a question of giving them rewards. In those days, we had only ether and these rats were sick to their stomach, so they wouldn't eat. So the experiment was for naught. Anyway, it goes back that far. It finally came out as something which is most important.

R: It certainly is. People are very willing to undergo surgery without really thinking about there being any cost to it.

G: Every now and then you can't avoid it. If you have an appendix or you have an acute something or you have a tumor or need it because of trauma, you have to do it. But if you do it for cosmetic reasons, you really need to think about it. If you limp a little bit versus not limping, try the limping.

R: Why do you think anesthesiologists are so interested in the history of their specialty?

G: I say this a little sheepishly, but it's such a short history, you can still master that going back just 150 years. I don't know the answer to that. Anesthesia has been called the greatest gift to mankind because of the curse of pain that has been with us for so long. I don't know that anesthesiologists are special in this. You find many people who have no inkling of anything in anesthesia history. I have written, I must admit, a few papers on history of anesthesia. If you look through my bibliography, you'll find it. Utter fascination with what was going on.

R: It's certainly dramatic and it dramatically changed surgery. Once you had anesthesia, the whole character of the surgeon could change, to a certain extent. You didn't have to be callous and operate very quickly and ignore the screams of the patient.

G: We wish they would still operate quickly. We take care of the screams of the patient and, in the process, they've become fairly slow. No doubt about it, it's an enormous event in the history of medicine. Couldn't even be fathomed how important it is. I think [Donald] Caton [professor of anesthesiology at UF] makes these wonderful observations in terms of our attitude toward pain. I have an old

book dating back to 1700 something or other. It's a German book written by a physician for house use. The idea that pain is something that is given by God is very obvious there.

R: The idea then was that there's a reason for it.

G: We are all sinners, so you may not even know where you have sinned, but you get it anyway.

R: Certainly when anesthesia was introduced, that was an issue.

G: Particularly with obstetrical anesthesia, where it was very much not in harmony with biblical thinking.

R: Now, we see pain as almost unnatural.

G: The government published a booklet some ten years ago or so which almost made it a constitutional right not to have pain. Physicians are encouraged to document their success or failure of taking care of pain in patients. Pain has been called the fifth vital sign. It's striking, [the] difference in thinking about pain that we have today.

R: Prior to being able to anesthetize someone for surgery, we did have morphine or certain products derived from opium.

G: We [did], and we had that for quite some time. By far, not to the same degree. For setting fractures and things like that, morphine doesn't do anything there, or not enough. So for surgical interventions, it was monstrous, the terror, torture.

R: Do you have any other reflections?

G: No, I may think of something when I leave and I'll let you know.

R: Thank you very much. This concludes the interview with Dr. Gravenstein.

[End of interview]