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NEENA B. SCHWARTZ, PhD

Interview conducted by
Michael Chappelle
June 15, 2008

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INTRODUCTION

Neena B. Schwartz, William Deering Professor Emerita of Biological Sciences at Northwestern University, is a pioneer in reproductive endocrinology for more than fifty years. She has made important contributions toward understanding the hormones involved in communication between the brain, pituitary gland, and reproductive organs; her long-standing interests include the mechanisms by which this communication normally occurs and how system dysfunction leads to reproductive disorders and disease. Throughout her career, she has been one of the most important leaders in promoting the careers of female life scientists and in creating an environment within national societies and granting agencies that has enabled many female scientists to follow in her footsteps.

BIOGRAPHICAL SKETCH

Dr. Schwartz was born in 1926 in Baltimore, Maryland. After obtaining her undergraduate degree from Goucher College, Dr. Schwartz completed her PhD degree in physiology at Northwestern University in 1953. She began her career as assistant professor of physiology at the University of Illinois College of Medicine in Chicago and in 1957 became director of biological laboratories for Michael Reese Hospital's Institute for Psychosomatic and Psychiatric Research and Training. She returned to the University of Illinois College of Medicine in 1961, serving as professor of physiology, assistant dean of faculty affairs, and professor of neuroendocrinology. In 1973 Dr. Schwartz joined the faculty of the Feinberg School. The following year she was named Deering Professor and chair of the Department of Biological Sciences in the Weinberg College of Arts and Sciences. In 1980 she founded Northwestern's Program for Reproductive Research (now the Center for Reproductive Science), which became a premier training site for students and investigators in reproductive endocrinology. Dr. Schwartz has made many seminal contributions toward understanding the hypothalamic-pituitary-gonadal axis and its control. Her early studies on the rat estrous cycle established many of the basic tenets of cyclical changes in gonadotropin secretion upon which current views of the HPA axis are based. Dr. Schwartz's interest in differential regulation of pituitary FSH and LH secretion led her to describe a nonsteroidal feedback factor from the ovary involved in controlling the secondary FSH surge, and her laboratory went on to make many important contributions to the study of ovarian inhibin. She has been recognized by numerous awards and honors, including the Carl Hartman Award from the Society for the Study of Reproduction and election to the American Academy of Arts and Sciences in 1992. Dr. Schwartz co-founded the Association for Women in Science and within the Endocrine Society founded Women in Endocrinology.

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I FAMILY BACKGROUND AND EARLY YEARS

Chappelle: Dr. Schwartz, please tell me a little bit about your family background starting with your grandparents.

Schwartz: Well, my grandparents were born in Russia; in fact, my parents were born in Russia. My dad came to this country with his parents in about 1912, I guess. He was just 12 or so, so he was just a kid. My mother came with her parents in 1921 after the Russian Revolution, so they left at that point. Both of them wound up in Baltimore, Maryland, and fell in love and got married. So I grew up in Baltimore.

Chappelle: Why did they leave Russia? And what was it like for them when they first got here?

Schwartz: I think they left--as far as my dad was concerned, I think his older brother had come here and was doing well professionally. So I think the family felt they would do better here. With respect to my mother, I think her family--after the Communists took over, I think they were uncomfortable and decided to come over here and were helped, in fact, by my dad's brother, who was also a relative. When they got here, I think they did well. They worked hard--the usual immigrant story. My dad went to high school here and wound up opening a small grocery store, one of these mom and pop stores, and he did well. That's the beginning.

The Great Depression and World War II

Chappelle: What was it like for you growing up during the end of the Depression and during World War II?

Schwartz: Well, we always had food. You know, if you have a grocery store, you can walk out and get the food. I think they did well. We were not rich, but they did okay. And my dad really wanted to get out of the retail business, and in the late thirties, he sold the store and we moved to the suburbs, the Great American Dream. He went into another kind of business, a wholesale business.

I was in junior high or just starting high school when the Japanese bombed Pearl Harbor. As a kid, it was very exciting to me. Living in Baltimore with so many defense factories--there was a big civilian defense operation started. My dad was head of a large sector. I went to the Red Cross, and I became a messenger, which meant I had a gas mask and a badge. And during the war, whenever the sirens--we frequently had air-raid sirens--I would go walking with my air-raid warden. It was a very exciting time. Luckily, there was never any bombing of Baltimore, although there were probably some offshore submarines. But it was exciting for a kid to do that.

Early Education

Chappelle: When you were going to school in Baltimore during the 1930s and 1940s, the public school system was segregated

Schwartz: Absolutely. Absolutely segregated, yes.

Chappelle: How did that strike you as a kid?

Schwartz: Well, [pause] there was a kind of isolation to it because we were surrounded by African-American kids, and we weren't going to school together. So I was walking almost a mile to a white school although there were schools for African-Americans much closer. There were never any problems, but I don't think I really thought about it. It was not something on my radar screen until later in that respect. It's not the way to live.

Chappelle: What kind of a student were you?

Schwartz: Oh, I was a good student. [laughs] I was a good girl.

Chappelle: What were your favorite subjects?

Schwartz: English. No question about it. I took the science courses I needed to take and got good grades, but what I was really interested in was English. And I was interested in journalism. And in fact, once I got into junior high, I got on the junior high newspaper. And I did that in high school, and then I went ahead and did it when I got into college. So this was a dream that I had that went on for a long time.

II GOUCHER COLLEGE

Choosing Goucher College

Chappelle: Why did you choose Goucher College?

Schwartz: Goucher was considered a very good school; it is still a good school. It was a women's college at that time. And my parents really didn't have enough money to send me away to school. Goucher was possible because I was able to work; I started working in the summers and the evenings when I was sixteen. And with the scholarship and the money I earned, I was able to go there. I guess I could have gone to the University of Maryland with a less expensive tuition, but Goucher was known as a quality school and that's what I wanted to do.

Deciding on physiology and research

Chappelle: What happened to your dream of being a journalist?

Schwartz: I took a science course. [laughs] No, Goucher was a liberal arts school. And the nice thing about a liberal arts school is that you're forced into taking other kinds of courses. I took a physiology course and I absolutely was bowled over. I realized--I had never realized before that science is creative. I mean, that just sounds sort of naive, but that's the way I felt. And I decided that I was going to be a scientist. Well, you know, I hadn't taken chemistry, I hadn't taken any physics, I had dropped math early, so it was not easy. I showed up [laughs]--I remember showing up at the department of physiology, talking to the chair, and saying, "I'd like to be a physiologist." And she said, "Well, have you finished your math?" And I said, "No." She said, "Have you had any chemistry or physics?" I said, "No." [laughs] But I did it because I really wanted to do it. And I wound up as a physiologist.

Chappelle: Were you thinking about being a doctor at that point?

Schwartz: You mean a physician?

Chappelle: Yes.

Schwartz: I never really thought about being a physician. I wanted to do research. I mean that is what really turned me on.

Chappelle: Who was Curt Richter and how did you come to work in his laboratory?

Schwartz: Curt Richter was a physiological psychologist at Johns Hopkins, which, of course, is also in Baltimore. And the physiology department, which was still, I think, a little suspicious of my change to science, *insisted* that I spend the summer--this is my sophomore and junior year--working in a laboratory. He was looking for some research assistants, so I was interviewed by him, and he gave me a job for the summer at Hopkins. Actually, I worked on patients; I was working with patients who were being operated on. So that was my first research experience, at Johns Hopkins that summer.

Chappelle: Could you say a little more about what you were actually doing?

Schwartz: Yes. I was working with patients who had high blood pressure. And at that time there were no drugs that anybody could use for high blood pressure. So what they were doing--the surgeons were removing--cutting the nerves from the spinal chord to the blood vessels. And if you do that, the blood vessels don't constrict--get smaller--and that lowers your blood pressure. And it's a pretty drastic surgery as I think about it now. But there was no good way at that time of testing whether you had really cut the right nerves. But the same nerves that went to the blood vessels also went to the surface of the skin, and you *can* test what's on the surface by sweating. So I would take the patients who were post-surgery and put them in a hot box, heat them up, get them sweating, and then I could tell where the

sweating was missing. And the sweating was missing in the areas where the cuts had been. So that was my first research experience.

Chappelle: What was Dr. Richter like as a teacher and a personality?

Schwartz: Well, he was very remote, at least this was my feeling. I didn't know anything. I mean I had just had my beginning physiology, so I kept asking him questions. And he said, "Well, go to the library." Well you know, that's not a bad idea, but I needed some kind of start. So I feel that he could have been closer, but I realize in retrospect that he was a busy man; he had a big laboratory--the rest of the students from Goucher were doing studies with rats, not with patients--so he's not what I would describe as a good mentor, at least not for me.

Chappelle: Were you aware of his scientific stature at the time?

Schwartz: Probably not. It was only retrospectively that I realized his tremendous reputation, mostly--frankly--in the rat work. Maybe that's why I didn't realize what a major scientist he was, because I wasn't working with the rats; I was working with the patients.

Jackson Laboratory, Bar Harbor, Maine

Chappelle: How did you come to be at the Jackson Laboratory in Bar Harbor the following summers?

Schwartz: The chair of biology at Goucher, Gardner Moment--I took several courses with him--he thought I should have some more experience in the lab, and I really thought so, too. Also, I wanted to get away from my parents. I was living at home, so it was a good idea, I thought, to get out of town. Moment suggested that I apply to Bar Harbor, and I did, and I got in. They have a summer program--and they still have it; it's a marvelous program. So I found myself taking a train to Bar Harbor, Maine, and I worked with a guy named Meredith Runner, who was a development biologist--marvelous guy, very different from Richter in terms of mentoring. He was very warm, very accessible. So I feel very lucky that I had that first summer at Bar Harbor. I learned how to work with mice instead of humans.

Chappelle: What were the experiments that you were doing?

Schwartz: The first summer--I wound up there two summers--I was working with a strain of mouse that is lethal; that is, if you had a homozygous, a mouse with genes for this particular trait from both parents, the mouse never lived; it failed to implant into the uterus. And he was trying to find out whether the defect was in the fertilized egg or whether it was in the uterus. He developed a mechanism for looking at the uterus--and that's what I did. So I was using electrical stimulus to check whether the uterus was capable of responding to the stimulus--as well--in what was called the "yellow mouse," and in an intact mouse. As a matter of fact, it turned out the

uterus was perfectly okay, and that was my result. Only subsequently--I've now gone back and looked at the literature and found that, indeed, the fertilized egg as it grows is unable to penetrate into the uterus, and that's why it was lethal. In that sense my result was okay. That is, the uterus was okay.

III NORTHWESTERN UNIVERSITY

Deciding on graduate school at Northwestern

Chappelle: How did you envision your life as a scientist at this point?

Schwartz: I knew that I wanted to go on doing this, and that the way to do it was to go to graduate school. By the time I got back to Goucher for my senior year, I was just gung-ho for it. I was also [laughs] editor-in-chief of the newspaper that year, which was kind of a funny thing. So I started applying to graduate schools. I applied to four of them, and I got into all of them, and I went as far away from my mother and father as I could [laughs]; I went out to Chicago to work at Northwestern.

Chappelle: How were you supported as a graduate student?

Schwartz: I got a four-year fellowship from Northwestern, and then I also earned extra money assisting in the labs for nursing students and medical students.

Chappelle: What was your thesis?

Schwartz: I was working with Allen Lein. Allen was a thyroid physiologist, wonderful guy, marvelous mentor. For my master's thesis, I was working on a method for measuring iodine in the blood, which is useful clinically in patients with either *hyper*thyroidism or *hypo*; that is, either excess thyroid or low thyroid. For my PhD, I actually measured muscle. I made rats either hypothyroid or hyperthyroid and stimulated their muscles in order to get them to do work. We could measure both the amount of work the muscle was doing and the amount of oxygen the animal was consuming, and we could look at efficiency. Efficiency is the amount of energy that is required to do an amount of work, and we were hypothesizing that that efficiency was going to be different in animals that either had an excess of thyroid hormone or a deficit.

Chappelle: What were your results?

Schwartz: My results were somewhat unexpected because there was a [pause] problem, [laughs] as a matter of fact. There was another student working in the lab on a separate project with cats, and the day I was going to start my experiment, Jack's cat got away. I had a rat sitting there on the table, and I was so scared that the cat was going to get my rat. I picked up my rat, and the cat knocked over the stimulator for the muscle. And I didn't notice that, as it fell to the floor, one of the

dials was turned around. Anyway, so it turned out that I used the wrong frequency of stimulation. But that turned out to be the most interesting thing of my thesis. Because it turned out that the animals with too little thyroid had perfectly smooth muscle contractions, whereas the animals with too much had very wavy oscillatory contractions. And that turned out to be the most important thing: a good lesson in serendipity.

Chappelle: Did being a woman cause you special concerns about job prospects?

A woman in science

Schwartz: You know, it never occurred to me. I mean, we were treated--the department of physiology certainly never--at least I was unaware at the time. Let me tell you one thing that happened to me when I was a graduate student [laughs] that did make me think about it. I was carrying around--this was before computers--and I was carrying around this big slide rule because that's the way I calculated everything. And I was on the elevator in the Ward Building, which is where my lab was. And one of the men got on who was one of the physicians who worked at the medical school and said, "What's a little girl like you doing with a great big slide rule?" [laughs] If that had happened today! I didn't say anything; I smiled. I was a good girl. But it did sort of make me wonder a little bit. Anyway, I didn't really think about it. There was not a lot of consciousness-raising in those days, and I assumed, maybe naively, that I would do okay.

IV UNIVERSITY OF ILLINOIS MEDICAL SCHOOL (1954-1957)

Chappelle: How did you come by your position at the University of Illinois Medical School in 1954?

Schwartz: One of the--oh, this is really relevant to what you were just saying. There was *one* woman in the department, [pause] and she was pregnant. And the department chairman didn't think that a pregnant woman should lecture to medical students, which you know sounds insane today. Anyway, they were looking for another physiologist and hired me as an instructor. And so I got my first job at the University of Illinois Medical School in physiology.

Chappelle: You were teaching physiology?

Schwartz: Yes, I was teaching nerve-muscle physiology to medical students; I was also teaching a whole quarter of physiology to the pharmacy students. So I had a fairly heavy teaching load.

Chappelle: What about your research?

Schwartz: Well, I applied to NIH for a grant and got it. It was a lot easier to get grants in those days, I think. So I was able to get enough money to set up my equipment. I

was continuing to work on the thyroid and muscle function. So I set up my lab and got going.

Chappelle: So you were working on the thyroid all the time that--

Schwartz: Yes, I continued to work on the thyroid. But I kept thinking about the project that I had done at the Jackson Lab. In the second summer that I went there, I also did something that was relevant to reproduction. And I was really fascinated by that and thinking maybe I should make a switch. And so I began gradually to think about projects in reproduction, although I was funded for the thyroid work. And so I gradually began to make a switch.

Chappelle: Why did you leave the University of Illinois?

Schwartz: The chairman of the department was very pompous. And I--you know, it was not a comfortable--the rest of the faculty were fine; it was not very comfortable. So there was a negative feeling that I had about the department.

V MICHAEL REESE HOSPITAL (1957-1961)

Getting into a new field

Schwartz: But I think that the major thing was positive; and that is, that Roy Grinker who was chair of psychiatry at Michael Reese Hospital wanted somebody to come over there--he had a fairly large grant--wanted somebody to come over there and do some work on patients, looking at stress and the nervous system in patients who were depressed. And I was beginning to be interested more in the nervous system than in the thyroid. And the work that I was doing in reproduction began to be interesting with respect to the nervous system. So I saw this as an opportunity to get into a new field. Also, my service to the hospital was really to make sure that the lab was running correctly, that all the measurements were okay, but I had--he got me a technician, which I hadn't had before. And I had a really good lab setup. So it was a good setup for me.

Influence of the earlier work at Bar Harbor and the switch to reproductive endocrinology

Chappelle: Could you say a little bit more about the actual research you were doing there?

Schwartz: Yes. By this time--let me go back to Bar Harbor because it really started there. In the second summer that I was there, I was working on a different project--with Meredith again. We were trying to find out when the pituitary released ovulating hormone in a group of mice. And I learned to do hypophysectomies--that is the removal of the pituitary--it took me almost all summer to do it without killing the mice, but finally I did. So I was doing these hypophysectomies, and as control I was using Nembutal, which is an anesthetic. And I found that the Nembutal was

blocking ovulation just as well as taking the pituitary out. Now, at that time that didn't mean anything; I mean, people didn't understand that. *I* certainly didn't understand it. And it wasn't until a few years later that a couple of scientists, Everett and Sawyer from Duke, showed that Nembutal could block ovulation in the rat if you gave it at a specific time. Well, I then thought back at what I'd done in Bar Harbor, and I thought, You know this is really neat. I mean, you don't have to do surgery; all you have to do is give Nembutal to an animal and you can block this. I tried it; I tested it; it worked in the rat the way Everett and Sawyer said. And then I began to say, Well, wait a minute, if we can do this, this way--what they showed was that you could give the Nembutal over a very short two-hour time period during the cycle, and if you gave it before that, it didn't block ovulation; if you gave it after that [it didn't block ovulation]. So there was this time period where the brain was vulnerable to Nembutal, and I got so turned on by that idea: that there's something going on in the nervous system over a two-hour period that was really controlling the cycle. And I just started working on that.

VI UNIVERSITY OF ILLINOIS MEDICAL SCHOOL (1962-1972)

Return to the University of Illinois Medical School

Chappelle: Why did you go back to the University of Illinois in 1961?

Schwartz: There was a new chairman in the department, and they invited me back, this time as a tenured associate professor. Again, I was the only woman in the department, but I saw it as a way of--I was missing teaching, and I really enjoyed teaching the medical students--it was nice to get back. And also it was easier to get graduate students. So I was beginning to want more graduate students, and a hospital is not the place to bring graduate students in.

Chappelle: And what research were you doing in this period?

Schwartz: By this time we had stopped doing any thyroid research, and everything was on reproduction. So at that point we were trying to find out exactly when the pituitary was releasing luteinizing hormone [LH], which is what causes ovulation. So we started working on that.

Chappelle: And what did you accomplish?

Schwartz: Well, we showed that there was a time of day on one day of the cycle when the brain was stimulating the pituitary to release luteinizing hormone and cause ovulation. And what we began to look at was what made that day different, because the clock--the so-called clock that was causing the luteinizing hormone release--was operating every day, but only on one day out of four days, or one day out of five days, was the pituitary releasing its hormone. So we hypothesized that

there must be something different happening on that day. I thought maybe it was estrogen being released by the ovary. And we got anti-estrogen, and it turned out that I was right; that if we gave an anti-estrogen on that day, even without the Nembutal, that we were able to block ovulation because the estrogen wasn't turning on the LH. So that *really* got me launched into doing all kinds of measurements during the cycle to see what made the cycle continue working.

Chappelle: Who were your collaborators?

Schwartz: Well, we were working with Charles Ely from Columbia, who gave me some antiserum to LH, which we were also using, and--mostly my students at that point, although we did start working--since I was interested in the rat--Margaret Orsini at Wisconsin was working on the hamster, and Margaret and I were able to show that the hamster had exactly the same mechanism as the rat. And one of my students showed that the mouse had the same thing. So by that time, we had plotted it all for the hamster, the mouse, and the rat.

VII NORTHWESTERN UNIVERSITY (1973-PRESENT)

Establishing a center for reproductive science

Chappelle: Why did you go to Northwestern after that?

Schwartz: By that time I was on a NIH study section; in fact, I was on one of the sections that was looking at the research being done at NIH. And in talking with some of the NIH people--they were encouraging me to see if I could build some kind of a center at Illinois, bringing in a number of people of different backgrounds to do an interdisciplinary. I thought it was a good idea. So I got other people interested at Illinois and found that the chair of OBGYN, which was really critical to a reproduction grant, was not interested in doing this. So I was really discouraged at Illinois. And at that point, the chair of physiology at Northwestern, which was a very different department than when I was a student years before, invited me to come over to Northwestern, so I did. So I went back home. And then, within a year at the medical school at Northwestern, I was invited to become the chair of biology at the Evanston campus, which is the graduate school/undergraduate campus. So I became chair of biology.

Chappelle: Why did the NIH want you to get this group started?

Schwartz: Well, NIH was interested in trying to build multidisciplinary research at that time, to try to put up centers. It seemed the way to go in reproduction: to try to put together clinicians, biochemists, physiologists, endocrinologists. And so, I bought into it; I felt that this was the way to go. It was obvious that I couldn't do it at Illinois, and I managed to do it later at Northwestern.

Chappelle: What questions were you asking at Northwestern?

Schwartz: Well, I was continuing to work on the cycle. One of the things I haven't said, that I was interested in, was the basic: what is it that makes something cycle; what is it that makes something repeat day after day after day; or, for the rat--every four days there was an ovulation, or every five days--and what is it that's controlling that? At that point, I began doing some computer modeling. NIH gave some grants for computer modeling in endocrinology, and I got one of them. So we were trying to sort of look at the big picture--what I would regard as the big picture. I was doing that at the time, spending a fair amount of time. We built a computer model that ovulated every four days [laughs] or every five days. I was doing that at Northwestern.

Chappelle: What did you accomplish during this period?

Schwartz: We got a computer model. The chairmanship was a little rocky. I enjoyed it, but I discovered that, being chair, you were sort of a target. It was fun; I hired some people, some very good people, and we began working together. And finally, I was able to get a center started at Northwestern, which I think in retrospect was probably the best thing I ever did in my career. I got a terrific center; Kelly Mayo is now director of the center.

VIII DISCOVERING INHIBIN

Chappelle: When I said accomplishment, I meant--I was talking about inhibin.

Schwartz: Ah! You were talking about inhibin. Well, how could I forget inhibin! [laughs] Thank you for reminding me. I mean, every endocrinologist wants to discover a hormone.

I've been focusing in talking with you on luteinizing hormone, but there was this other gonadotropin from the pituitary called follicle-stimulating hormone (FSH), and it is the hormone that stimulates the follicles in the ovary to grow up, and then the luteinizing hormone comes along and causes them to ovulate. And in our studies on the cycle, we kept seeing that on the day which is proestrus, which is when the luteinizing hormone is secreted, that the follicle-stimulating hormone, instead of falling the way the luteinizing hormone did after it was released, the follicle-stimulating hormone just kept going up. And there didn't seem to be a good explanation for that. Because by this time we knew, from lots of work that other people had done, that there was a peptide from the brain called GnRH, or gonadotropin-releasing hormone, which was released--this is what the Nembutal was blocking. So that the GnRH was being released and that was causing both LH and FSH. Well then, if that's the only thing that's causing LH and FSH, why is it that LH can go down and FSH can go up?

A number of years ago, people had postulated that there was another hormone--from the testes, actually, *not* from the ovary--called inhibin, which would inhibit

follicle-stimulating hormone. And you know forty years had gone by, nobody had been able to isolate it, and it got very disreputable. And I said, "Well, maybe this inhibin is released from the *ovary in the female*." It didn't ordinarily suppress this follicle-stimulating hormone, but on the afternoon of proestrus, which is when the LH is going up and then falls, maybe this inhibin *falls*, and that causes the follicle-stimulating hormone to go up, that afternoon or the next day. This was the hypothesis, but I had no way of testing it. But Cornelia Channing, who was a professor in physiology at University of Maryland, was looking for a substance in ovary follicle fluid, which would turn off the inhibition of meiosis in the eggs at the time that the LH came on. I don't want to go into too much detail on that. But anyway, so she was using follicle fluid to look for one kind of inhibitor, and I asked her if she'd send me some of it, and she did. And we injected it into female rats on the afternoon of proestrus--and lo and behold--the FSH really plunged instead of going up. I've never seen a result that was clearer. So there was an inhibin in this follicle fluid. Not only was it important to demonstrate what was going on in the cycle, but the fluid gave gallons of material from which people could isolate the inhibin. So the biochemists and the molecular biologists jumped in and were able to isolate the inhibin within a few years. And there it is. I guess that's my claim to fame.

On being first

Chappelle: What enabled you to be the first person to find that?

Schwartz: Well, I like to think it's because I'm a real physiologist. [laughs] We thought about the problem from the standpoint of the whole animal; we were looking for the substance, and we were lucky enough to have somebody who could provide us with material with it. I like to do research that comes out of hypotheses like that.

Chappelle: But there are a lot of physiologists out there. What was it about your strategy or approach?

Schwartz: Well, I think it was a strong physiological strategy. We needed something that was coming from there; we needed it in order to explain the cycle. And we looked for it. I *really* enjoy doing research that way, where you think about a project and you say, "Well, this is the way it's got to work and we can maybe find it here." And that's what we did. So I think it was the approach. The other thing--the reason--one reason why it had taken so long to isolate this material was that people were looking for it in the male--and it turns out to be in a much lower concentration in the male--and they never really had a standard assay for measuring it. I mean, one lab would do one thing and one lab--we established a standard assay, and once we established it then everybody could do the same experiment and show the same thing.

Chappelle: Are you saying that it was your training as a physiologist as opposed to being an endocrinologist that enabled you to--

Schwartz: No, my training as a physiologist as opposed to being a chemist--a biochemist. [laughs] We're all endocrinologists.

Commercial applications of inhibin

Chappelle: Did you pursue any commercial applications from your discovery?

Schwartz: No, I didn't. [pause] You know, *women tend not to*. I don't know why. Obviously, there are commercial applications now. But most of the commercial applications now have been in the measurement. For example, inhibin in the blood--inhibin measurements are now being done, not routinely, but frequently in the blood as a measure of testicular function in humans and as a measure during pregnancy and as measure in certain kinds of ovarian cancer, which is probably the most important. But no, we--I didn't pursue anything.

IX THE ASSOCIATION FOR WOMEN IN SCIENCE

Chappelle: What was it like for a woman in science in the late 1960s, early 1970s?

Schwartz: Well, [pause] I was doing okay in my career, but it was obvious to me that not very many women were doing very well. Feminism was in the air. I think my interest in this started at a Federation meeting; I think it was 1971. The Kontes Glassware Company had been supporting a wine and cheese for women at the Federation meetings--the physiology meetings. One evening when they were about to close up, I think all of us were a little bit--had had a fair amount of wine by that time. There were a group of twenty-seven of us who decided not to go home; I mean not to go back to our rooms. And we went off someplace to somebody's room and decided to start an association for women in science. I mean it was kind of funny if you think about it. Here we were--crowded in this room. And we were angry because we felt that--well, a lot of the women in the room--I had a tenured position, but a lot of women in the room were working in somebody else's lab. So we decided to start an association for women in science. And we gradually grew--there were maybe a hundred women. And we decided as our first major step to sue NIH, [laughs] which is a pretty bold thing to do. Let me tell you something about where that suit came from. I had never been on a study section at NIH; I had never been on one of the study sections that looked directly at grants that came in, and none of the other women in the room had been either. So we got a list from NIH of their study sections, and it turned out that there were--when I say we, the group of women who had formed AWIS [Association for Women in Science]--it turned out that there were almost no women on the study sections. The thing that really infuriated us, though, was that there was a list of people on the breast cancer panels, and out of three hundred people on the breast cancer panels, there were only two or three women. And that absolutely outraged us. We approached a lawyer--a firm in Chicago that had done a fair amount of pro bono civil rights work. And by we, I mean not only the AWIS, the

Association for Women in Science, but a group of sociologists for women in science, and physicists--a group of women physicists--a number--the American Medical Women's Association. So we took out a class action suit against NIH to prevent them from appointing any further people to study sections until they started appointing women. We went to Washington--a group of us went to Washington and met with Bob Marsten who was head of the NIH at the time and talked about what we were concerned about. And he agreed that if we withdrew the suit, he would start putting women on and asked us for a list of women who would be capable of serving on study sections. Well, we had a list of over a thousand women who could be put on. And women started being put on. And so the suit was dropped. So that was the outrageous thing that we did with respect to the NIH. [laughs]

Chappelle: Did they follow through immediately?

Schwartz: They certainly did.

X THE ENDOCRINE SOCIETY

The founding of Women in Endocrinology

Chappelle: Why did you feel the need for an additional scientific organization for women within the Endocrine Society?

Schwartz: That was precipitated by a talk that was given--I guess it was '75--by Janet McArthur, who was a pediatrician from Harvard. She had amassed a group of data from the Endocrine Society. Basically, what the data showed--and she presented this at the business meeting--was that not a single woman had ever been an officer of the Endocrine Society and that there was not a single woman on any of the central committees in the Society. You know, there was a scattering of women on some of the other committees, but the finance committee, the nominating committee--what Janet regarded as the central committees--that there were no women on it. So a group of us--again, I mean [laughs] if you get angry enough--formed Women in Endocrinology. And I guess the rest is history.

Chappelle: Did you do anything outrageous in this instance?

Schwartz: [laughs] You mean did we sue? No, I don't think so. Actually in a way, it was never really necessary. Because my sense is that as soon as we got together--what we did was--I think the first thing we really did was start to nominate women for offices, you know, going through the regular Endocrine Society procedures, and people began getting elected. And I think--I never sensed any great resistance to this, and I think other people felt the same way. But I think we've made a real difference. I think Women in Endocrinology has made a real difference in the Society.

Chappelle: What were the most compelling issues that you were involved with when you were the President of the Endocrine Society?

Schwartz: Well, they were all clinical [laughs] which was sort of upsetting. Fortunately, I had a number of clinical endocrinologists at Northwestern--which is where I was at the time--who helped me solve them. Frankly, I can't think of anything right now.

Support for newly emerging scientists

Chappelle: In a period of tight funding, what do you think the Endocrine Society can do to help newly emerging scientists establish themselves?

Schwartz: Well, I think this is really crucial, and I think the Society has at least started doing something with the grants that they are now giving; they're small, but when you're starting out, a small amount of money can make all the difference in the world. So I think the sort of backup funding that the Society is trying to keep going now is very good. And I guess urging our government to put more money into basic research--everybody's concerned about obesity; everybody's concerned about diabetes. Well, these are problems that endocrinologists are interested in. And I think we need to fight for more money.

XI CURRENT VIEWS ON REPRODUCTIVE ENDOCRINOLOGY

Chappelle: What are your current views of the field?

Schwartz: Of reproduction or endocrinology in general?

Chappelle: Your choice.

Schwartz: My choice. [laughs] Well, fertility has become a business in a way, and designer babies. [pause] I think the big problems right now in reproductive endocrinology or in the reproduction field are the attitudes of our citizens: the very strong anti-abortion attitudes, the concern about--instead of teaching kids about reproduction and how not to get pregnant--trying to keep them away from all knowledge. I think these are social issues, and I think--as a reproductive biologist--that the conflict between the social issues and the research issues is very high. I don't know why this is true in this country, why there is so much concern about this, but there is.

Chappelle: Well, thank you.

Schwartz: Thank you.

End of Interview

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Interview History—Neena Schwartz

Dr. Schwartz was interviewed by Michael Chappelle on June 15, 2008, during the Endocrine Society's Annual Meeting held at the Moscone Center in San Francisco. The interview took place in a conference room at the Marriott Hotel and lasted 50 minutes. The transcript was audit-edited by Mr. Chappelle and reviewed by Dr. Schwartz prior to its accession by the Oral History of Endocrinology Collection. The videotape and transcript are in the public domain, by agreement with the oral author. *The original recording, consisting of one (1) 60-minute videotape, is in the Library holdings and is available under the regulations governing the use of permanent noncurrent records.* Records relating to the interview are located in the offices of the Clark Sawin Library's Oral History of Endocrinology Project.