



Nobel Voices Video History Project, 2000-2001

Interviewee: Erwin Neher
Interviewer: Neil Hollander
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HOLLANDER:

Doctor, could you please introduce yourself for us.

NEHER:

Well, my name is Erwin Neher. I am at the Max-Planck Institute for Biophysical Chemistry in Göttingen. My field is neurobiology.

HOLLANDER:

What is it that you do? What exactly is it?

NEHER:

We are studying the elementary processes of signaling in the neural system, which the action potential which carries the signal along the nerve fiber. But then what's really at the heart of our interests is how a signal travels from one nerve to the next one, how nerves speak with each other.

HOLLANDER:

And that is the reason you received the [Nobel] Prize?

NEHER:

Well, it more or less resulted out of the things I received the Prize for, if you want to know what I received the Prize for, I guess. In the mid-seventies, we were interested in the question, what these signals in the nerve are based on, what the molecule mechanisms of the signals are. It had been known at this time that when an action potential travels along a nerve fiber, there is a sequence of so-called permeability changes in the nerve membrane. Each nerve fiber is surrounded by skin, by a membrane, you know, and electrical properties of this membrane make the nerve impulse go.

What two famous British researchers by the name of Hodgkin and Huxley found out in the early fifties is that when the nerve impulse travels along this fiber, there is a sequence

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of increase in the sodium permeability and permeability of the membrane towards the iron sodium, sodium followed by a similar permeability increase to potassium.

What we were interested in is what the molecular mechanisms are which underlies these permeability changes, and what we wanted to prove—there were certain ideas about this. What we wanted to prove was that there are pore like molecules, so-called ion channels, in the membranes, which open and close when the nerve impulse travels, you know. For this we developed new methods so that one could measure currents in such membranes as much better than usual, it was possible before, and so we could show that there are discrete steplike changes in current when these channels open and close.

HOLLANDER:

Could you draw a line or a link between your work and something very practical that we could use or will use in the future?

NEHER:

Well, I mean, very practical. If I speak, if I feel this, always action potentials going in my body, you know. And the work we did helps understanding this in the context of all the other things which happen in the body. Very practical things, I mean, meanwhile once these sensitive methods have been available to study these channels, it has become apparent that these channels are the targets of many of the well-known drugs that we are using for this and that, you know, drugs whose mode of action previously had not been known but which are now known to act on these channels.

HOLLANDER:

Now jumping a little bit. How did you become interested in science? Was there a particular point in your life that you decided “This is what I want to study. This is what I want to be”?

NEHER:

Well, I had always been interested as a little boy, you know, in the things in the garden, what’s growing, what all the animals are, the birds, so I was used to be there for myself and just watch things, you know. I found out during high school time as a school kid that on the one hand I had a certain ability to observe things, you know. On the other hand, I was really interested in looking into how things fit together. I had a great passion in taking apart all kinds of technical apparatus—watches, clocks, radio apparatus. I always want to take things apart and see how they fit together, how they work.

HOLLANDER:

Did that ever get you into trouble?

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NEHER:

[Laughs] Yes, now and then, yes.

HOLLANDER:

For example?

NEHER:

Well, I don't remember details, but there were definitely a few things which I took apart and didn't quite get back the way they were supposed to be. But usually I concentrated these efforts onto old stuff which wasn't so precious anymore.

HOLLANDER:

Was there a particular person or book or event that you could single out and say, "This influenced me"?

NEHER:

Yes. I mean, when I then, say, was a high school kid at the age of sixteen, seventeen, eighteen, I happened to get hold of books which described the then very recent knowledge on how nerve impulse works, you know. I mean, the subject which became my later area of research. I remember one book which was edited by a person from University of K____, Steinberg [phonetic], Professor Steinberg, who was taking up these ideas of cybernetics. Kubernetik [phonetic] in German, was a very fashionable word at that time, I mean, coined by Norbert Wiener.

In this book, which was called *Kubernetics, Cybernetics*, there were a few chapters. On the one hand, Steinberg's favorite kind of thing, the so-called learning matrix, a device he had which was a little bit a predecessor of modern-day neuron networks, and there were also one or two chapters on these new findings about the nerve impulse.

At that time, I had just realized that also I was very fond of just observing things, nature and so on, that I had a certain ability at school to do math and physics, you know. So this seemed to be the kind of ideal combination in interesting biological phenomenon, nerve impulse, based on physical principles, electricity flowing, you know. So I had more or less in my mind to go along this path, to do as a study what I knew I know to do, what I was good at school, and then take this as a basis to go into biological research to try to describe biological phenomena on the basis of physics and chemistry, I mean what's called biophysics, you know.

So I did my physics study, and then at some time I decided I had now to go more towards

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biology, so I applied for a Fulbright fellowship with the intention to broaden my physics background into biophysics, because this kind of interdisciplinary study wasn't so easy to do in Germany at that time.

HOLLANDER:

What subjects were you bad at?

NEHER:

Partly, languages, you know. I was never very good in the arts. I did play piano, but never really made it to mastership, you know. For some time, Latin was a problem, you know. But I somehow managed to handle these things, but with much more effort than, say, handling things in mathematics and physics.

HOLLANDER:

Did people call you a good student, a bad student?

NEHER:

I think I was among the better ones, yes.

HOLLANDER:

Do you have any favorite science jokes?

NEHER:

Science jokes.

HOLLANDER:

Or put another way, could you give us an embarrassing moment that happened to you or a humorous moment that happened to you in your professional career? Were you ever wrong?

NEHER:

Oh, sure, I was wrong. I mean, you make hypotheses one after the other one, and some of these are wrong. That's no problem to be wrong, isn't it? I mean, you make a hypothesis and you follow it and try to prove it, and while doing so, you may make some wrong conclusions because you are really convinced, but in the end you have to let convince yourself by the experiment.

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HOLLANDER:

Can you give us an example?

NEHER:

I tend to forget these things, you know. [Laughs] You know, [German word] here, yes.

HOLLANDER:

Okay. We'll turn to another subject. If an adolescent comes to you and says to you, "Doctor, Professor, what do I do? What do you think I should do? What do you think I should read? Where do you think I should go? Or how do you think I should occupy my life?"

NEHER:

I would say, "Try to find out what you are interested in, you know, and read and do whatever you think is a good thing, is an interesting thing." It's important to follow one's interests. Of course, if they are not there, then, can't help. But most young people are really interested in many things, and these are really the questions then which occupy your mind. If you are good at it, you find your research area and you can contribute.

HOLLANDER:

What other interests do you have outside of science? Is your life totally absorbed by science or—

NEHER:

Pretty much it's absorbed by science, yes, pretty much absorbed. I mean, I have a big family. I have much fun with my kids, you know. I said before, I do play piano, so now and then, quite rarely, I sit down and play one or the other things, but purely for myself, not for any other audience.

HOLLANDER:

What do you play?

NEHER:

What do I play? Mainly classic. Classic, Beethoven, Bach.

HOLLANDER:

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Does that help you in your thinking in any way?

NEHER:

I wouldn't say that helps in my thinking, no, no. I don't do it as often that you could say I develop a habit of while playing think about this and that. I mean, I'm not so fluent in these things. I have to concentrate on playing. It's not that my mind gets free and I get the very best ideas from when I do that, but I enjoy it when I feel leisurely enough to be able to concentrate on it.

HOLLANDER:

As a scientist, or in any way, where do you feel the world is going now?

NEHER:

Well, I think the modern biology will have a very great impact on our lives. Of course, information technology equally well. I think it will enable us to do things that we can't really dream of, and I hope that all these new possibilities are being used with good sense and responsibility, you know, to make people's lives easier.

HOLLANDER:

What about socially? Where do you think that society is going?

NEHER:

Society? It's not an easy answer, not an easy question, you know. I mean, not being in social sciences, all I can express my hopes that openness, communication, global exchange of ideas will help to make people reasonable.

HOLLANDER:

Any other way?

NEHER:

Any other way? There may be some help from psychologies, social sciences, to understand a little bit better what the motivations are, you know, what the particularly dangerous situations are of a society, you know, of what an individual to not behave reasonable, you know. So I think learning a little bit more about how we are made up, you know, may be helpful. Of course, also another, the other side, is it opens the potential for manipulation, so we have to think of that.

HOLLANDER:

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On a very personal sense, what are the things you dislike in people and life?

NEHER:

What are the things I dislike? Well, of course, you will see many things that you dislike.

HOLLANDER:

Asparagus?

NEHER:

Yes.

HOLLANDER:

Anything, food or kinds of people, arguments?

NEHER:

I dislike certain kinds of people. I dislike attitudes of people who just look what kind of in Germany we say [German], you know, what society is supposed to give to them, you know, and don't ask what I can contribute or what I can do myself. I dislike people who think they know everything hundred percent and better than anybody else, you know, because nobody does so. Yes, that's about it.

HOLLANDER:

Asparagus?

NEHER:

Asparagus I like, yes. You had some at lunchtime today.

HOLLANDER:

I didn't.

NEHER:

You didn't? Yes, well, you know, asparagus, I like, yes.

HOLLANDER:

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We're just trying to find—we want to investigate a little bit more in a personal sense your personal life, if you don't mind, a little bit. You're married, you have children?

NEHER:

Yes, yes.

HOLLANDER:

How many children do you have?

NEHER:

Five children.

HOLLANDER:

Grown?

NEHER:

Between thirteen and twenty-one.

HOLLANDER:

Do you spend a lot of time with them?

NEHER:

As time allows, yes. But meanwhile, I should say, they have developed pretty much their own planning of the day, and they're not always available.

HOLLANDER: Do you feel that you have really influenced their lives?

NEHER:

I hope not to do so much, you know. Of course, it's nice to see that they maybe accept the one or the other thing, you know, but I think they should have their own life, and particularly when in the situation where one has this kind of recognition from Stockholm, you know, it may be difficult for the kids to find their own way.

HOLLANDER:

How has the Prize changed your life?

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NEHER:

For some time it has changed my life, you know. Of course, it is quite disruptive at the moment when the Prize comes. Of course, it is very rewarding to obtain this recognition. On the other hand, you just cannot go on the way you used to go on. I mean, when I received the phone call, I had prepared to analyze some data which I had obtained half an hour before, and I wanted to get them done in the coming weeks to get things published, and there was no way to think of that anymore, you know.

Then you are confronted with many things that you have not been used to. People expect many things from you once they have heard about the Nobel Prize. So a Nobel Prize winner is good for many things, not just for those things that he got and developed the Nobel Prize for, but that's a problem because you aren't good for all these things, you know. So you have to learn how to handle all the different requests, different ideas that people approach you with.

It then depends on your personality, on your abilities. For some people it's a welcome chance to get more active, to be able to move more things, you know. For other people, it is disruptive, distracting from those things that they are real good for, you know. I consider myself more among the second category, because my strength is not to organize a big science, but to do my own experiment, to watch, you know, and to try to find out matters of detail.

So after I had learned this, I think I found this balance that I do some things in addition, connected to the possibilities which are offered to you through the Prize, but I try to restrict this to a very few which I think really help me in being able to do things I want to do anyway and maybe a few more things. But otherwise, I try to concentrate on pretty much—

[End of interview]