PAULINE OLIVEROS INTERVIEWS BERNT MATTHIAS

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PO: What I'm interested in is to find what is interesting you in your work, or what's holding your interest in your own work at this particular time?

BM: One is to discover connections between phenomena in nature, to discover things nobody has ever known before.

PO: How do you know that no one's ever known them before.

BM: Because I read.

PO: (laugh) You keep up on it.

BM: I keep up rigidly.

PO: What changes have occurred in your attitude about your own work over the...

BM: Well, I've become more tolerant towards the mistakes of others. At first I thought that only theorists made mistakes, but then I came to the conclusion experimentalists make more mistakes which are more damaging because an experimentalist is usually considered as a reality and the truth, and when that is presented the wrong way, then that is much more than a bad theory. So I've become more tolerant towards the theorists but a good deal less tolerant toward the experimental approaches.

PO: What is a good experimental approach?

BM: One, that first it's reliable and it can be repeated, that looked at all the alternatives and that is comprehensive. The comprehensive part is really the essential one because there are many phenomena in nature which people happened to discover accidentally, and then since they couldn't go on from there, they didn't know how to continue, they said this is a unique event, this is a phenomenon that is very isolated and there is nothing else like it. That has misled science and physics and condensed matter physics on an unbelievable

goose chase for the last 50 years. And, well, I managed to disprove this notion of accidental research by showing that if you do it right you can find similar research all throughout nature. This was true for fair? electricity, which is the electric analog to magnetism, it was true for circuit conductors, it was true all throughout and people just pretended they had been looking for, but had not--well, they might have done it but they did it in such a sloppy way that they didn't find it. And therefore they misdirected and misguided the approach of many others. You see, somebody comes and says, I have looked high and low throughout all the compounds for this and this phenomenon--it doesn't exist. And people took him seriously. Then suddenly I realize, could it have been that he was just stupid and negligent. So I checked it and it turned out that he was stupid and negligent. But you see, this is not, this also is not a nice labled? event. The number of experimentalists who have done bad work is unbelievably large. For instance, there is a lady in Strasbourg who looked for fair electricity for a long time, and she investigated one compound in particular which had been investigated for the last 40 years, namely ammonium sulfate, which is one of the most common materials known. It is artificial manure, you can buy it in every drugstore, ammonium sulfate is everywhere. Now, ammonium sulfate has some peculiar properties, and since 1916 people have been working on it, because the question is easy to obtain and doesn't cost much and the phenomena happen in a temperature which is quite accessible. They were roughly in the average 11 papers for the 40 years working on this material, and not one of these papers recognized that the material was fair electric. When we published it, that we discovered the fair electricity, which is a very primitive and easy experiment--anyway, we discovered it and published it. For more than 6 years not a single paper was published afterwards. By then there would have been--on that rate of proclivity

there would have been about 66 papers published. Not one. And the lady--she met me at a meeting in Wisconsin--she burst into tears. She said, how could I miss it? Just tell me it isn't so. Well, there wasn't a thing I could tell her except that--she was well-known. And I have noticed this again and again. Therefore--in the past I ignored my own feeling for, when I felt the experiment was wrong I decided ah, well, maybe I'm just prejudiced. I found out that my instinct was far better than my reasoning and when I feel now that somebody is wrong I don't hesitate.

PO: So that represents a change, a real change.

BM. It's a real change. For instance, 5 years ago in San Diego a new discovery was announced which would, had it been true, literally transformed all of physics. People in Philadelphia announced that they had discovered ? circle of activity in organic materials at very high temperatures, far higher than anybody ever suspected, and in agreement with some totally wrong theories. During the talk there were 2500 people listening in awe to this great discovery. There were the best physicists in the world here, some were my guests. They all told me, you're wrong if you think that there is nothing to this experiment. This is probably the most pathbreaking, earthshaking, revolutionary experiment there is. It is the sensation in physics and would go into history as such. I told them it would to into history as a complete and utter nonsense of a man who didn't know what he was measuring and who was too crooked to admit once he had realized his mistakes. At that time I was alone against pretty much the whole establishment, which is about 20,000 people. I said it is all wrong. The only people who believed me were the science writers from the Tribune, the Evening Tribune and the Union, because they had known me for a long time. They said, well, if you are sure this is wrong we are going to report it, which is certainly (element? of course). Compared to this Scientific America and the

New York Times and 4000 other selected newspapers were in euphoria about this sensational discovery. And of course the money that was spent by the government on this sensational discovery exceeded by far $12 million. It took a year when suddenly it became obvious that all had been wrong. Not just marginally--it had been a complete and utter stupidity, and the cause of it that the man who had painted the silver base electric contacts under question just had not painted them correctly. I'd always felt that the underlying reason was ridiculous and that it was not a scientific mistake, it was a mistake in propaganda and attitude. And so, my whole attitude has changed completely. I am very tolerant now when somebody makes a theory because for all I know it might be true. But if anybody publishes a wrong experiment, i.e. this man has tried to publish ever since--my feeling is he shouldn't even be allowed to publish ever again. Because he has led hundreds and hundreds of people astray.

PO: I heard an interesting comment from a friend of mine that Roger Bacon and his exposition of what was called the experimental method. But that there was a mistake and that the word experimental was really supposed to experiencial. It seems to me that that would have had a far-reaching effect.

BM: Well, it only confirmed my opinion that on the average the experimentalists are much lower calibre than the theorists.

PO: Maybe this experiential is left out.

BM: Probably. Well, it's also misguided ambition, quest for money, propaganda, Madison Avenue techniques at their worst. Because I am convinced Madison Avenue techniques really have invaded physics on a large scale.

PO: Wherever there's power there will be corruption. What changes have you experienced say in your emotional states in regard to your work.

BM: In regard to my work?

PO: Yes. Are you aware of those states?

BM: Oh, certainly I am aware of them. I usually look at my own work with a profound sense of humor. I think it's all very funny. And 2½ years ago we were sitting in Switzerland, you know, that's where I come from. I go back of course very often. We were sitting in the cafeteria of the University of Lucerne and had something to drink because in Europe the cafeterias all have alcohol in contrast to here. And we were talking about physics and I suddenly had a very intriguing idea which frankly I sort of characterized as cute, and my friends thought, oh well this is really quite intriguing, maybe we should really think about it. For all the next year we really thought about it and we made a theory from this idea. I said, look, since we are going so much out on a limb, why don't we say we're going to predict something. If the theory is true then this prediction, of course, as a matter of fact has to be fulfilled. The editor of the journal said, are you sure you want to stick out your neck that much. I said, oh sure, because we can always weasel out of it, we have seen that done so often, and I don't think anybody will do it anyhow because it involved some highly dangerous materials like beryllium which today nobody dares to touch if they can help it. Some people have to use it but they use it with masks and specially aired rooms and so on. So I don't think anybody would ever check on it. I was wrong there. My friends in Laussane said, oh, we are not scared of these things, we can do this right away. And I had sort of an ambiguous feeling, I thought, oh well, I didn't expect the day of reckoning should come that soon. I said all right, let's look at it. So we made it. And low and behold, everything was exactly as we had predicted it. Now we had predicted properties of a compound which I had found only twice amongst 8000 materials looked at. An enormous number of materials had been looked at, only twice had we found it. However, now we had found it for the third time, only this time it was predicted. The first two times were strictly

by serendipity. So then my friends said, look, don't you think the time has come that you should start sort of to be ideas. Maybe you should take yourself more seriously. I said, oh, I can't do that. But now and then I thought well maybe I should listen more to what I think is right or what functions and so forth. So now and then I am no longer quite as constant about my ideas. It's the only change.

PO: A little lighter. What about changes in your philosophy or do you work from a philosophical position.

BM: Strictly. /That everything which is true must be simple. Not always first but that if you really come to a true explanation it can't be complicated.?

PO: Has that evolved, has that always been so for you.

BM: Always been.

PO: Now I want to ask you about what the creative event or process is in your work for you. It's interesting because in talking about an experiment it has to be repeatable and predictable and so on, which is sort of opposite from what we recognize and say something is a creative event.

BM: No, a creative event is not an experiment. It's something over which you have no control.

PO: Can you give me an example?

BM: Oh, sure I can give you examples, but they won't be very enlightening. For instance, when I realized that this ammonium sulfate was fair electric I was driving through Pennsylvania through fields / where there had been artificial manure put on the fields, which smells very bad. And I thought ammonium sulfate again. Then suddenly it occurred to me. Or in Switzerland where I was sent to get liquid air by hand in the outlying districts even though we were told not to do it. The streetcar did not stop in front of the institute but it went around

a curve. And we just jumped off the streetcar when it went around the curve with this bottle of liquid air. And twice just at the moment that I jumped off I had a good idea. So people suggest that you better go back and ride the streetcar with liquid air.

PO: Are you aware of your own attention processes as distinguished from the content of your work?

BM: I don't know. Just like you decide, now I'm not going to think, of course you think, I'm not going to think. So I can't answer you because I don't know.

PO: Yet in each case as you've been talking you talked a lot about the more intuitive side of the way you work and that you have in changing your attitudes come to trust your instinct, what you call your instinct.

BM: Much more than I used to, yes.

PO: I wonder if you can look back a bit and see some kind of an evolution of that.

BM: Yes, I've come to rely on it more and more than ever before.

PO: How did you become aware of that and learn to trust it.

BM: Because it works.

PO: Because it works. It works for you.

BM: Well, I couldn't tell about anybody else.

PO: Would it be possible to impart this kind of feeling of trust.

BM: No, I think that would be very dangerous because very often I've come to realize particularly with having students that one should not try to mold them according to some . I'd much rather let people work with me, do it their own way. Now and then when a students says, I think, I usually say, well if you must but I rather you didn't. Why don't you just feel? Very often they continue, well what's good for you isn't good for me, and vice versa. Then why I think this is very dangerous, I remember once I decided when I was a kid I was

going to observe exactly the moment that I fall asleep. As a consequence I didn't go to sleep. I fell asleep during the day constantly. At night I decided now I don't want to observe it again, but it didn't work. So for almost a year I slept during the day but not at night. It was very awkward. So I think that one should treat one's own intuition, one's own internal life with a great deal of caution and preferably neglect, not to pay too much attention. In one of the interviews of the university there was one question: when are your creative periods? They wanted to know how professors spent this time, write down your creative periods. I wrote from 9:11 in the morning until 9:14,sometimes 9:15, which was of course nothing but a ridicule. They took it seriously. They said, how come at this time? I said, well you must understand this is much later in Switzerland at this hour. Well, you cannot sit down and say, now I'm going to create a little bit. It comes when you talk to people; it comes sometimes when you don't talk to people; no blueprint for it.

PO: Okay, that sounds like a good place to let you off the hook.

BM: Well, I hope it's what you want, I really don't know.

PO: It's only a kind of probing.

(end of interview)